Variations in Organisational and Employee Responses to High-Impact, Low-Probability Events

Riddle, Lorna Isabel

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King's College London

VARIATIONS IN ORGANISATIONAL AND EMPLOYEE RESPONSES TO HIGH-IMPACT, LOW-PROBABILITY EVENTS

Submitted by LORNA ISABEL RIDDLE to King's College London as a thesis for the degree of Doctor of Philosophy in War Studies, December 2014

Acknowledgements

I could not have completed this PhD without the invaluable support and expertise of my supervisors Dr Brooke Rogers and Dr Richard Amlôt. They were always available when I needed them for help or advice and when I needed words of encouragement as the impending deadline loomed on the horizon. I also know that their mentoring and guidance will not stop the day I complete this thesis. They won't get rid of me that easily.

I would also like to give special thanks to Rick Cudworth and Dr Sara Ulrich at Deloitte, for not only providing me with direction and support, but also for giving me an opportunity to produce a piece of research with a real world application. They also put me in touch with the members of my PhD advisory board - a group of industry experts, who also contributed a great deal to this research.

I am especially grateful to Dr Holly Carter and Dr Fiona Mowbray – I don't think I could have finished a PhD without witnessing them do it first and come out the other side relatively unscathed. We laughed together, (very nearly) cried together and generally kept each other sane. A number of other colleagues from Public Health England also provided support and expertise along the way and I would particularly like to mention the Microbial Risk Assessment and Behavioural Science teams.

Finally, I would like to thank my parents Marta and Peter and my fiancé Shervin for their unwavering support. They were the poor souls who had to put up with me throughout this long and often stressful journey; particularly the last few weeks when many an evening and weekend were sacrificed in the name of completion. I dedicate this thesis to them.

Abstract

High-impact, low-probability events such as chemical, biological, radiological and nuclear (CBRN) terrorist attacks have the potential to cause serious disruption to national infrastructure organisations in the UK. Although research examining the willingness and ability of healthcare workers to report to work during an extreme event has been conducted, little is known about levels of willingness and ability for employees of other sectors of national infrastructure.

This thesis presents much needed evidence regarding the likely concerns, behavioural responses and information needs of employees of national infrastructure organisations in the UK during extreme events, with a focus on CBRN terrorist attacks. An interview study revealed that many resilience professionals assumed their staff would be willing to report to work during extreme events and had not placed sufficient emphasis on facilitating staff willingness to return to work during a crisis. An employee web survey revealed that in the case of some CBRN scenarios, less than a quarter of staff reported they would be willing to go to work. A series of employee focus groups revealed that staff will face a variety of barriers during a CBRN incident and will expect a great deal from their employer, including medical interventions and accurate, scientific information. At present, it appears likely that national infrastructure organisations' plans will not meet the expectations of their staff and will fail to address their numerous practical, psychological and communication needs in the event of a CBRN terrorist attack.

This research has drawn on theories of risk perception and risk communication, alongside theoretical frameworks from health psychology and social psychology, to understand likely employee responses to extreme events. A series of recommendations are suggested for UK national infrastructure organisations' business continuity plans and activities, including strategies that could be used to motivate and support staff in their return to work during an extreme event.

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Chapter 1: Introduction

Background and Context

Extreme events such as natural disasters, terrorist attacks or other public health emergencies have the potential to cause significant disruption to businesses and, consequently, to national infrastructure as a whole. Past natural disasters have caused widespread physical destruction, often resulting in severe economic impacts. For example, in the wake of Hurricane Sandy in 2012, the US Department of Commerce reported that the tropical storm had caused billions of dollars of damage.[1] It was also estimated in 2013 that the storm would reduce employment by 11,000 workers in New Jersey and would cost an estimated $41.5bn to repair the damage in New York. Additionally, there have been many examples of business disruption caused by terrorist attacks, the largest and most significant being the 9/11 World Trade Centre attacks in 2001. These attacks resulted in widespread destruction of physical infrastructure, destroying buildings that housed a number of key international financial institutions.[2] The impact of this was not only unprecedented in terms of loss of life, but also caused significant disruption to the financial markets. London has also seen its fair share of terrorist incidents with the majority of incidents being undertaken by the Irish Republican movement, as well as the more recent Islamist-inspired July 7th 2005 bombings. The 7/7 bombings resulted in 52 deaths and significant disruption to the transport network; however many businesses were able to resume operations within two working days due to the incident only causing localised damage to infrastructure.[3] In light of these examples it is evident that extreme events can vary greatly in terms of their impact upon society, governance and businesses.

The nature and scale of an incident or terrorist attack can play an important role in the ability of organisations to recover from the resulting disruption. Some incidents can be confined in respect to the physical scale of the impact, such as the July 7th bombings. Others, such as infectious disease outbreaks, can have consequences which are more widespread and longer

[1] United States. Economics and Statistics Administration, 'Economic Impact of Hurricane Sandy', October 2013, http://www.esa.doc.gov/Reports/economic-impact-hurricane-sandy.
[2] United States. U.S. Securities and Exchange Commission, 'Summary of "Lessons Learned" from Events of September 11 and Implications for Business Continuity', accessed 13 December 2014, http://www.sec.gov/divisions/marketreg/lessonslearned.htm.
[3] United Kingdom. London Chamber of Commerce and Industry, 'The Economic Effects of Terrorism on London - Experiences of Firms in London's Business Community', August 2005, http://www.londonchamber.co.uk/docimages/754.pdf.

term, impacting the ability of organisations and countries to carry on as normal. This thesis draws on evidence from natural disasters and influenza pandemics, whilst focusing on high-impact, low-probability events such as: catastrophic terrorist attacks; novel, potentially fatal infectious disease outbreaks; major accidents which pose public health risks; and large-scale chemical, biological, radiological and nuclear (CBRN) events. Although other types of high-impact, low-probability events are included in the National Risk Register (NRR), such as cyber-attacks on infrastructure, volcano eruptions and major transport accidents, it is not feasible or appropriate to include all scenarios in this research.[4] The majority of this research uses CBRN terrorist attacks as a useful case study in order to attempt to understand responses to high-impact, low-probability events.

The UK's counter terrorist strategy (CONTEST) states the need to protect the country from the threat of CBRN terrorist attacks, as well as planning for the response and recovery if an attack were to occur.[5] [6] The UK Government considers all terrorist attacks a serious threat to the nation due to their capability to cause significant disruption and loss of life. However, in contrast to conventional explosive incidents, CBRN incidents can have the added complication of a contagious element or contamination, making recovery more challenging.[7] CBRN terrorist attacks are universally recognised as high-impact, low-likelihood events.[8] They are high-impact due to their potential to cause widespread disruption and loss of life; however they are also considered low-likelihood due to the difficulty terrorists would have acquiring the necessary materials and executing a successful attack. Although there have been relatively few examples of terrorist groups using CBRN as part of their strategy, the threat of a CBRN attack occurring in the UK remains a serious concern. One of the planning assumptions of CONTEST is that terrorist groups including Al Qa'ida will continue their long-term aspiration to use CBRN materials in a future attack.[9] It was previously reported that Al Qa'ida had set up facilities in

[4] United Kingdom. Cabinet Office, 'National Risk Register of Civil Emergencies', 2013, https://www.gov.uk/government/publications/national-risk-register-for-civil-emergencies-2013-edition.
[5] United Kingdom. HM Government, 'CONTEST The United Kingdom's Strategy for Countering Terrorism', July 2011, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/97995/strategy-contest.pdf.
[6] United Kingdom. HM Government, 'The United Kingdom's Strategy for Countering Chemical, Biological, Radiological and Nuclear (CBRN) Terrorism', March 2010, http://webarchive.nationalarchives.gov.uk/20100418065544/http:/security.homeoffice.gov.uk/news-publications/publication-search/cbrn-guidance/strat-countering-use-of-CBRN?view=Binary.
[7] Ibid.
[8] United Kingdom. Cabinet Office, 'National Risk Register of Civil Emergencies'.
[9] United Kingdom. HM Government, 'CONTEST The United Kingdom's Strategy for Countering Terrorism'.

Afghanistan to conduct research and provide training on the use of CBRN weapons.[10] Further, it has been suggested that the risk of terrorists acquiring CBRN materials for use in an attack has increased in recent years due to:

- A significant increase in the trafficking of material that could be used in radiological/nuclear weapons.
- The increased availability of relevant technological information on the internet.
- CBRN materials being used for legitimate purposes (i.e. in nuclear energy).
- Inadequate security around decommissioned military CBRN material.[11]

It is also important to consider the public response to CBRN events in relation to the increased threat of CBRN terrorist attacks. The UK Cabinet Office and Ministry of Defence commissioned the Blackett review, which was published in 2012, and discussed the best approaches for identifying, assessing and managing high-impact, low-probability risks.[12] The review stated:

> For many high impact risks we do not understand what the public actually expects in a situation, or how tolerant they may be of 'abnormal' risks during a crisis. Exploration of these issues can be used to help inform how these types of risks are communicated to the public.[13]

In light of this comment, and the potential for organisations to put less emphasis on planning for lower likelihood events, it is vital that research is conducted to understand employee responses and expectations during a CBRN terrorist attack. These findings can then be used to inform risk communication, specifically the type of information that an organisation would need to send to its staff during and after a CBRN incident. The evidence-base regarding the business impacts and employee reactions to CBRN events is limited due to the limited number of previous CBRN terrorist attacks and the low likelihood of these events occurring. As a result, the discussions presented in this thesis will also draw on more traditional risks (e.g. influenza pandemics and natural disasters), in order to ascertain the ways in which businesses and their staff currently react to these higher probability incidents. The research will then test these current trends, principles and assumptions in respect to the impacts of CBRN events on national infrastructure organisations and their staff.

[10] United Kingdom. HM Government, 'The United Kingdom's Strategy for Countering Chemical, Biological, Radiological and Nuclear (CBRN) Terrorism'.
[11] Ibid.
[12] United Kingdom. Government Office for Science, 'Blackett Review of High Impact Low Probability Risks', January 2012, https://www.gov.uk/government/publications/high-impact-low-probability-risks-blackett-review.
[13] Ibid., 24.

CBRN incidents are especially interesting in light of the ability of national infrastructure organisations to continue providing basic services. This is because incidents involving CBRN hazards can have acute negative health effects, as well as considerable potential for widespread psychological and behavioural consequences. For example, the 1995 sarin attacks in Tokyo and the anthrax attacks in the United States bring into sharp focus the potentially serious effects a CBRN incident can have on both the physical and psychological health of a population.[14] [15] [16] These physical and psychological impacts can, in turn, have a disruptive effect on worker productivity levels and, consequently, a significant impact on businesses. For example, Capitol Hill staff workers experienced concentration difficulties and an inability to focus on work as a result of the anthrax attacks in 2001.[17] Some mentioned avoidance of related information, others said they were in denial or just wanted to forget about the incident. This level of distress is clearly not conducive to business continuity, especially when one considers that those employees who experienced distress from the September 11th terrorist attacks were more likely to be absent from work in the weeks after the event.[18] These examples provide evidence of the potential psychological effects that could be caused by a CBRN terrorist attack, and the subsequent disruption to organisations. If a CBRN terrorist attack were to occur on UK soil, there is a high chance it would cause widespread consequences in terms of the psychological health of staff at national infrastructure organisations. If key staff at these organisations were unable to function in the aftermath of a CBRN incident, it would make it extremely difficult, if not impossible, for the UK to recover and return to normal.

A terrorist incident involving a CBRN hazard has the potential to severely alter the everyday functioning of community, government and industry. As a result organisations must have plans, procedures and processes in place in order to minimise the disruption. These activities fall under the industrial framework of Business Continuity Management (BCM). BCM is focused

[14] R.M. Bowler, K. Murai, and R.H. True, 'Update and Long-Term Sequelae of the Sarin Attack in the Tokyo, Japan Subway', *Chemical Health and Safety* 8, no. 1 (January 2001): 53–55.
[15] Yuji Nishiwaki et al., 'Effects of Sarin on the Nervous System in Rescue Team Staff Members and Police Officers 3 Years after the Tokyo Subway Sarin Attack.', *Environmental Health Perspectives* 109, no. 11 (November 2001): 1169–73.
[16] Carol S. North et al., 'Exposure to Bioterrorism and Mental Health Response among Staff on Capitol Hill', *Biosecurity and Bioterrorism: Biodefense Strategy, Practice, and Science* 7, no. 4 (December 2009): 379–88.
[17] Carol S. North et al., 'Capitol Hill Staff Workers' Experiences of Bioterrorism: Qualititative Findings from Focus Groups', *Journal of Traumatic Stress* 18, no. 1 (February 2005): 79–88.
[18] Kristin Byron and Suzanne Peterson, 'The Impact of a Large-scale Traumatic Event on Individual and Organizational Outcomes: Exploring Employee and Company Reactions to September 11, 2001', *Journal of Organizational Behavior* 23, no. 8 (November 2002): 906.

on planning for the disruption that incidents could potentially cause to the components of the organisations that are critical to business operations in order to return to normal functioning in a timely manner.[19]

The UK Government Business Continuity Management Toolkit recommends organisations conduct a business impact analysis (BIA) to establish the critical or essential products and services that need to continue to function during a crisis, as well as the resources that are required to maintain these, such as: premises; technology; information; supplies and partners; and people.[20] With regards to 'people' the Toolkit suggests finding out the optimum number of staff required to carry out critical activities, the minimum staff level needed to provide some sort of service and the skills/expertise required. The recommended strategies to combat the impacts of staff absenteeism are focused on how to ensure the work continues (through cross-training of skills, geographical separation of skills and third party support) rather than how to increase the ability or willingness of the existing staff to report to work. However, real incidents such as the 2001 anthrax incident in the US and hypothetical incident studies such as Gershon et al., have demonstrated that not all staff who can report to work necessarily will, and if they do, they may not be productive due to the psychological impacts of the incident.[21] [22] In light of this, more focus is needed on the potential reasons for staff being absent during an incident and on the requirement for organisations to accommodate the practical and psychological needs of their staff during high-impact, low-probability events such as CBRN terrorist attacks.

Although organisations can often function in the short-term without their key staff, this is not always the case. Staff absenteeism has the potential to severely affect business operations and impact on revenue, as illustrated by local manufacturing firms losing an estimated $7.67mn in the value of production in the week after the 1979 Three Mile Island (TMI) nuclear disaster in Pennsylvania.[23] This loss was caused by a number of factors including interruptions to the supply chain and public concerns over contaminated food products. However, one of the key

[19] United Kingdom. HM Government, 'How Prepared Are You? Business Continuity Management Toolkit Version 1', 2013, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/137994/Business_Continuity_Managment_Toolkit.pdf.
[20] Ibid.
[21] North et al., 'Capitol Hill Workers' Experiences'.
[22] Robyn R. M. Gershon et al., 'Factors Associated with the Ability and Willingness of Essential Workers to Report to Duty during a Pandemic', *Journal of Occupational and Environmental Medicine* 52, no. 10 (October 2010): 995–1003.
[23] Peter S. Houts, Paul D. Cleary, and Teh-Wei Hu, *The Three Mile Island Crisis: Psychological, Social, and Economic Impacts on the Surrounding Population*, University Studies 49 (Pennsylvania State University Press, 1988), 40.

causes of this loss of revenue was a lack of staff due to widespread evacuation. Consequently, this example shows that staff absenteeism has the potential to cause a serious financial impact on business operations.

This PhD thesis will examine the consequences of high-impact, low-probability events for businesses and for the staff who work in them. Specifically, the author will consider the impact of CBRN attacks on national infrastructure businesses in the UK. The thesis focuses on employees and the effect their responses to an incident can have on business continuity, rather than the recovery of physical assets, IT processes or supply chain issues. However, it is acknowledged that the impact on staff and the impact on physical assets and processes are often linked. For example, the denial of access to facilities caused by an extreme event can also have a psychological effect on employees. After September 11th, it was reported that workers appeared to feel a sense of loss for their former offices and also struggled with the crowded facilities they were faced with.[24] The return to work behaviour of staff after a serious incident forms the primary focus of this research. To date, this is an area that organisations and industry standards have failed to adequately address. BCM often has well developed strategies for the recovery of physical assets and restoring normal processes, as well as for ensuring absent staff members' work is completed by other individuals. However, it fails to take into account the importance of addressing staff concerns and facilitating their return to work, particularly for incidents that may continue for longer than a week or two.

The willingness and ability of staff to report to work

National infrastructure organisations must understand the factors informing staff willingness and ability to report to work in the event of a serious incident if they intend to engage in an effective response. The failure of key staff to perform their duties could have serious consequences for the individual organisations concerned and potentially for the country as a whole. Addressing a few key issues would improve national infrastructure organisations' ability to address staff concerns and accommodate their needs, which would help to build a more resilient workforce. These changes can be informed by (i) understanding the behavioural assumptions being made about employee response within existing business continuity plans and (ii) understanding the distinction between employees' willingness and ability to work.

[24] Carol S. North et al., 'The Business of Healing: Focus Group Discussions of Readjustment to the Post-9/11 Work Environment among Employees of Affected Agencies', *Journal of Occupational and Environmental Medicine* 52, no. 7 (July 2010): 15.

First, it is possible that organisational business continuity assumptions concerning the numbers of staff who would be willing or able to return to work in a timely manner after an incident are inaccurate. For example, one study asked healthcare workers about their likely decisions during an influenza pandemic; 95% said they would be *able* to work and 89% said they would be *willing* to work.[25] Similarly, in a study of essential workers (including hospital workers, police, and public health department workers), although 80% reported they would be *able* to report to work in a pandemic, only 65% said they would be *willing* to.[26] Therefore, it is possible that not everybody who *could* work during a crisis would necessarily want to do so.

Consequently, a distinction must be made between whether an individual is *able* to work, and whether she or he would be *willing* to work. The term 'able' is understood as meaning *available to work,* as per the definition used by Gershon et al.[27] It is also inclusive of an individuals' competency to work, as per the definition of ability used by McCabe et al. who refer to 'actual operational power (ie, skill, know-how) of an individual, organization or community to perform a task if the requisite external circumstances require and allow it'.[28] Therefore ability is concerned with whether or not an employee is *practically able* to work. McCabe et al. also define the term *willing to work,* stating that '*Willingness* refers to the state of being inclined or favorably predisposed in mind, individually or collectively, toward specific responses'.[29] In this case the specific response is the decision to return to work. Therefore, in this thesis the term 'willing' is understood as 'would work if practically able'.

This research will have a greater focus on the *willingness* of employees to report to work as a result of its grounding in psychological theory rather than business or technology-based theories. However, the concept of ability to work is not removed from the discussion entirely due to the potentially close relationship between the two concepts. For example, a parent whose child has influenza may not be *willing* to report to work because they want to care for the child, and thus because of this they would not perceive themselves as being *able* to report to work. The role this perception of ability plays is an important issue as the measure included in this PhD research and most previous research is based on self-reported ability rather than actual ability. Therefore the parent in the example above may in reality be able to go to work

[25] Andy Stergachis et al., 'Health Care Workers' Ability and Willingness to Report to Work During Public Health Emergencies', *Disaster Medicine and Public Health Preparedness* 5, no. 4 (December 2011): 303.
[26] Gershon et al., 'Factors Associated with the Ability and Willingness of Essential Workers', 999.
[27] Ibid., 996.
[28] O. Lee McCabe et al., 'Ready, Willing, and Able: A Framework for Improving the Public Health Emergency Preparedness System', *Disaster Medicine and Public Health Preparedness* 4, no. 2 (June 2010): 163.
[29] Ibid.

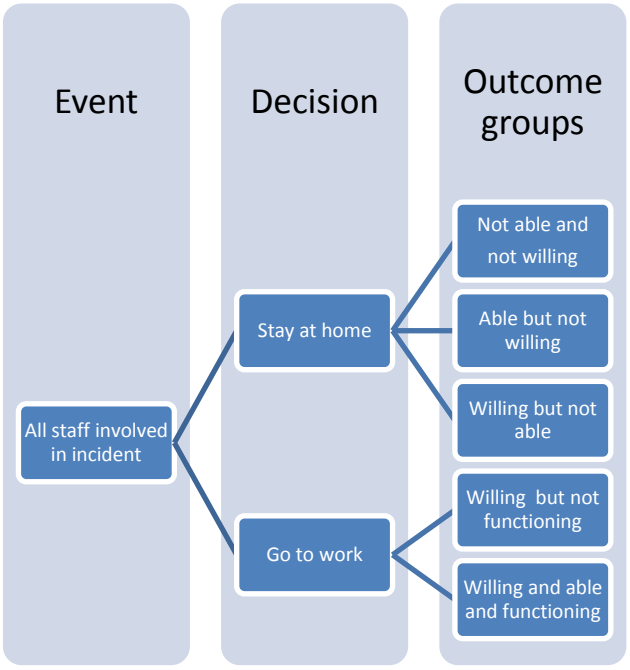
because they have someone else in their family or friendship group who could care for their child; however they may feel they need to care for their child themselves. This may be because they believe their child should be their responsibility, or because they feel their family comes before their job, or because they think they would worry too much about their child if they left them and went to work. Whatever the reason, the parent may perceive themselves as being unable to go to work. This example clearly shows the psychological aspect of the concept of ability to work and as such justifies why it cannot be removed entirely from the topic.

Although this research is focused on the decisions of employees to either report to work or to stay at home, it is also important to consider the circumstance in which an individual may report to work when they are either physically or psychologically unwell. This concept is known as 'presenteeism' and is considered by some as the opposite of absenteeism, which is where individuals take sick leave and stay at home when unwell.[30] If individuals feel they cannot or should not take sick leave, then in the event of a serious incident or crisis this may lead to staff being willing to report to work, but being unable to perform their duties to their usual standard. In recent years, researchers have become interested in the incidence of presenteeism as well as its impacts on industry, specifically in terms of productivity loss.[31] One study in this area reported that out of a sample of 3801 employed individuals, over a third said that they had gone to work two or more times in the last year even though they felt they should have taken sick leave due to the state of their health.[32] This concept could be especially significant in the event of a major public health incident in which affected employees should not attend the workplace due to the increased risk of spreading an infectious disease amongst colleagues. Further, by forcing themselves to come to work when they are physically or psychologically unwell they could actually lengthen their recovery time, thus increasing the negative impacts on the business.

Figure 1.1 shows the potential behavioural decisions of employees in the aftermath of a serious incident, as well as the interplay of ability to work, willingness to work and presenteeism (being willing to work but not being able to function once there).

[30] David J. Smith, 'Absenteeism and "Presenteeism" in Industry', *Archives of Environmental Health: An International Journal* 21, no. 5 (1 November 1970): 670–77.
[31] Gary Johns, 'Presenteeism in the Workplace: A Review and Research Agenda', *Journal of Organizational Behavior* 31, no. 4 (1 May 2010): 519–42.
[32] Gunnar Aronsson, Klas Gustafsson, and Margareta Dallner, 'Sick but yet at Work. An Empirical Study of Sickness Presenteeism', *Journal of Epidemiology and Community Health* 54, no. 7 (7 January 2000): 502–9.

Figure 1.1: Interplay between willingness, ability and presenteeism post-incident



It needs to be noted here that the focus of this research is on willingness and ability to report to work and that although the concept of presenteeism is not the focus, it is clearly an important factor that cannot be ignored. It is therefore recommended that future research examines the incidence of presenteeism and the resulting effects on worker productivity in the aftermath of extreme events. It would also be interesting to investigate factors that may influence presenteeism in the aftermath of an incident, such as perceived or actual 'replaceability', health status, importance of role or other demographic factors.[33]

The physical and mental health impacts of disaster

Large-scale incidents such as natural disasters, terrorist attacks and infectious disease outbreaks can have a significant physical and mental health impact on the affected population. Both physical and mental health symptoms could influence whether an employee is able and/or willing to report to work. As a result, employers have a role to play in assisting those individuals who are experiencing health problems as a result of the incident.

[33] Gunnar Aronsson and Klas Gustafsson, 'Sickness Presenteeism: Prevalence, Attendance-Pressure Factors, and an Outline of a Model for Research', *Journal of Occupational and Environmental Medicine / American College of Occupational and Environmental Medicine* 47, no. 9 (September 2005): 958–66.

Research conducted in the weeks, months and years following terrorist attacks have shown that a small percentage of victims will go on to develop a psychological disorder as a result of their involvement in the incident. For example Galea et al. surveyed approximately 1000 adults living in a specific area of Manhattan five to eight weeks after the September 11th terrorist attacks in order to assess the prevalence of post-traumatic stress disorder (PTSD) and depression.[34] The findings revealed that 13.6% of the sample reported symptoms meeting the diagnostic criteria for either PTSD or depression.

The psychological impact of the Tokyo subway sarin attacks is more difficult to estimate because follow up research is limited; however reports suggest a relatively large proportion of victims experienced symptoms of PTSD, anxiety and depression in the months and years following the event.[35] [36] One study conducted face-to-face interviews with a small sample (n=34) of victims of the Tokyo attacks and reported evidence of persistent PTSD symptoms five years after the attacks; 11 out of the 34 presented with current or lifetime PTSD.[37] The authors reported that 65.5% of the sample were still experiencing recollections, 48.3% continued to avoid places that triggered recollections, 43.3% reported tension and 42.9% reported forgetfulness. However, some of these symptoms may have been caused by the acute sarin poisoning. In addition, it is important to remember that research of this nature can be impacted by a non-response bias if the psychological consequences of the incident affect the willingness of victims to volunteer to take part in the study. Nonetheless, the research suggests that traumatic incidents such as terrorist attacks, including those involving a hazardous element, can cause a range of symptoms that may persist in the long-term, and that these symptoms (e.g. recollections, avoidance, anxiety, low mood and forgetfulness) would no doubt have an effect on people's willingness and ability to report to work.

Further, it is not just individuals diagnosed with psychological disorders whose work will be affected. It is possible that post-incident distress could result in individuals experiencing symptoms that either prevent them from being able and/or willing to report to work, or as in the presenteeism discussion previously, could impair them from being able to do their job once they get there. One study of British nationals in Japan after the Fukushima nuclear

[34] Sandro Galea et al., 'Psychological Sequelae of the September 11 Terrorist Attacks in New York City', *The New England Journal of Medicine;The New England Journal of Medicine* 346, no. 13 (2002): 982–87.
[35] Haruki Murakami, *Underground: The Tokyo Gas Attack and the Japanese Psyche* (London: Vintage, 2003).
[36] Bowler, Murai, and True, 'Update and Long-Term Sequelae of the Sarin Attack in the Tokyo, Japan Subway'.
[37] Toshiyuki Ohtani et al., 'Post-Traumatic Stress Disorder Symptoms in Victims of Tokyo Subway Attack: A 5-Year Follow-up Study', *Psychiatry and Clinical Neurosciences* 58, no. 6 (December 2004): 624–29.

accident reported that 16% of the sample met the criteria for distress.[38] Further, a study of Londoners in the weeks following the July 7th terrorist attacks found that 31% of the sample reported experiencing substantial stress.[39] Lastly, as mentioned previously in this chapter, after the 2001 anthrax attacks on Capitol Hill, staff reported experiencing problems such as denial, avoidance, concentration difficulties and an inability to focus on work, as well as an exacerbation of physical ailments such as headaches and gastrointestinal problems.[40] Again, these symptoms are clearly not conducive to optimum levels of productivity. In light of this, future research should aim to evaluate the influence of post-incident distress symptoms on the willingness and ability of employees to report to work, as well as their productivity levels if they do.

When considering both the psychological and physical health impacts of disasters on employees, it is important to discuss the capability of organisations to provide their staff with access to treatment. In terms of mental health, the strategies most often utilised by high-risk organisations to help employees exposed to serious incidents are peer-support programs. Peer-support programs make use of members of staff, usually volunteers, who receive training by mental health professionals in skills needed to help other members of staff in the aftermath of an incident, such as in psychological first aid.[41] [42] A study using the Delphi method recommended that peer-supporters are the initial point of contact for individuals involved in a high-risk incident, unless the employee requests otherwise, and that the peer-supporters identify individuals who may need further assistance and facilitate the pathways to professional help.[43] Peer-support programs are often used in high-risk organisations such as the military and the police; however it is unclear how prevalent these types of programs are within other sectors, such as transport or energy.[44] [45] In recent years there has been a move away from recommending the use of traditional 'trauma counselling' or conducting 'single-

[38] G. James Rubin et al., 'Anxiety, Distress and Anger among British Nationals in Japan Following the Fukushima Nuclear Accident', *The British Journal of Psychiatry* 201, no. 5 (11 January 2012): 400–407.
[39] G James Rubin et al., 'Psychological and Behavioural Reactions to the Bombings in London on 7 July 2005: Cross Sectional Survey of a Representative Sample of Londoners', *BMJ* 331, no. 7517 (17 September 2005): 606.
[40] North et al., 'Capitol Hill Workers' Experiences'.
[41] Mark C. Creamer et al., 'Guidelines for Peer Support in High-Risk Organizations: An International Consensus Study Using the Delphi Method', *Journal of Traumatic Stress* 25, no. 2 (1 April 2012): 134–41.
[42] David Forbes et al., 'Psychological First Aid Following Trauma: Implementation and Evaluation Framework for High-Risk Organizations', *Psychiatry* 74, no. 3 (2011): 224–39.
[43] Creamer et al., 'Guidelines for Peer Support in High-Risk Organizations'.
[44] Peggy Grauwiler, Briana Barocas, and Linda G. Mills, 'Police Peer Support Programs: Current Knowledge and Practice', *International Journal of Emergency Mental Health* 10, no. 1 (2008): 27–38.
[45] N. Greenberg, V. Langston, and N. Jones, 'Trauma Risk Management (TRiM) in the UK Armed Forces', *Journal of the Royal Army Medical Corps* 154, no. 2 (June 2008): 124–27.

session psychological debriefing' with non-selected trauma victims, as it does not have any recognised benefit, and could potentially do more harm than good.[22] If it were feasible to do so, then providing peer-support programs within national infrastructure organisations could be a useful alternative to traditional debriefing or trauma counselling, and could become an important part of building organisational resilience

Many large organisations currently provide an occupational health service and some also offer private healthcare to their employees. Occupational health providers have an important role to play in the event of a serious incident affecting employee health. However, some reports suggest that only a small minority of the UK workforce have access to occupational health services or occupational physicians.[46] [47] For the organisations that do have occupational health departments or private healthcare for their employees, they may have the ability to provide their staff with access to physical assessments and treatment as well as psychological support in the aftermath of an incident. This could be particularly useful due to the fact that GPs and other NHS services are often overstretched during normal operations; therefore private healthcare services provided by employers have the potential to relieve some of the added pressure that would occur in the event of a major public health incident.

Although healthcare provided by employers should not negatively impact on NHS provided care, it clearly has an important role to play. There are previous examples of when the relationship between the two has been successful, the most obvious being influenza vaccinations. Many occupational health departments have been able to provide their employees access to influenza vaccinations. Similarly, some individuals who would be eligible for a free influenza vaccination on the NHS choose to pay privately in their local pharmacy, for reasons such as accessibility, convenience and preference for the environment.[48] This a clear example of how private healthcare services can supplement NHS services and contribute to an increase in vaccination rates in order to meet WHO targets. However, it is vital that these services are designed in collaboration with public health officials to ensure that they adhere to current NHS policy and relevant legislation.

[46] P. J. Nicholson, 'Occupational Health Services in the UK—challenges and Opportunities', *Occupational Medicine* 54, no. 3 (5 January 2004): 147–52.
[47] J. C. McDonald, 'The Estimated Workforce Served by Occupational Physicians in the UK', *Occupational Medicine (Oxford, England)* 52, no. 7 (October 2002): 401–6.
[48] Claire Anderson and Tracey Thornley, '"It's Easier in Pharmacy": Why Some Patients Prefer to Pay for Flu Jabs rather than Use the National Health Service', *BMC Health Services Research* 14, no. 1 (24 January 2014): 35.

BCM in national infrastructure organisations: Accommodating the needs of staff

The present study focuses on business continuity in relation to organisations which operate in a sector of UK national infrastructure (although many of the key concepts and recommendations apply to all organisations). The UK's national infrastructure consists of the essential facilities, networks, systems and sites that are needed to keep the country functioning on a day-to-day basis.[49] There are nine sectors that make up this national infrastructure: communications, emergency services, energy, finance, food, government, health, transport and water. The ability of organisations which operate in these sectors of national infrastructure to continue to function during an extreme event is vital to keep the country running. This PhD research makes use of primary data from employees of all sectors and therefore does not limit the discussion to any particular sector. It should be noted that not all national infrastructure can be considered 'critical'; however some essential services and physical infrastructure within the sectors are termed 'critical national infrastructure' (CNI) if their failure could result in severe economic or social consequences or loss of life.[50] It is, therefore, vital that organisations including elements of CNI continue to function in the event of a serious incident. However, past focus has been on the recovery of the physical infrastructure and processes of these organisations and less on the likely behavioural responses of the staff that work for them.

The financial services sector is one of the nine sectors that make up UK national infrastructure. A case study of the financial services sector is a useful format for illustrating some of the key points, challenges and trends taxing business continuity managers today. Many of these trends are also reflected across other areas of national infrastructure. The financial sector is made up of organisations that provide financial services to retail and commercial customers. Without financial services people would not be able to draw money out of an ATM to buy food and other necessary supplies. Furthermore, almost all other businesses in the UK are supported by financial services, including those that provide essential goods and services such as supermarkets and transport providers.[51] Therefore, it is vital that financial organisations keep functioning in the aftermath of a serious incident. The financial services sector has continued

[49] United Kingdom. Centre for the Protection of National Infrastructure, 'The National Infrastructure', accessed 26 November 2014, http://www.cpni.gov.uk/about/cni/.
[50] Ibid.
[51] TheCityUK, 'Key Facts about UK Financial and Related Professional Services', January 2014, http://www.thecityuk.com/research/our-work/reports-list/key-facts-about-uk-financial-and-related-professional-services/.

to work to improve its resilience to disruption through research projects and exercising. For example, the Resilience Benchmarking project conducted by the Tripartite Authorities (Financial Services Authority, Bank of England and HM Treasury) surveyed approximately 60 financial firms and financial infrastructure providers in order to review the sector's resilience and produce recommendations for improvement. The 2005 exercise revealed that although the tangible infrastructure components of the organisations are relatively well protected, there is less clarity regarding the functioning and welfare of staff after an incident.[52]

Relevant key findings were as follows:

- Just over one third of organisations said that their staff would not be affected by travel disruption following a major operational disruption.
- A quarter of respondents' plans did not take into account where employees live or how they get to work.
- Just over half would expect staff to work from alternative locations for extended periods of time but had not consulted with employees on this or investigated whether this would work in practice.
- Twelve firms did not have next-of-kin data.
- Ten firms had provided business continuity training to less than 5% of their staff.

In a follow-up survey in 2008, an improvement was noted with regards to the inclusion of staff in crisis management.[53] Relevant key findings were as follows:

- Almost all organisations said that their plans took into account where employees live and how they get to work.
- Only half of all respondents had plans which include provision for staff transportation and alternative working arrangements (twice the 2005 level but still low).

The Resilience Benchmarking exercises have shown that although improvements have been made with regards to accommodating the needs of staff in an incident, there is still some way to go.

Similar trends to the ones seen in the financial services sector are also evident in other industry sectors. For example, in the Cabinet Office's summary of the sector resilience plans, a

[52] United Kingdom. Financial Services Authority, 'Resilience Benchmarking Project Discussion Paper: December 2005', 2005.
[53] United Kingdom. Financial Services Authority, 'Resilience Benchmarking Project Discussion Paper: June 2008', 2008.

loss of key staff is noted as a potential impact on the resilience of the energy and Government sectors.[54] However, the summary report includes no mention of the potential impact that a longer term loss of non-key staff could have on the sectors. In the transport sector, Boeing developed a business continuity model in the wake of 9/11 that aimed to develop plans to serve their customers, stakeholders, community and also their own employees.[55] On a positive note, the organisation provides employee training which includes disaster preparedness awareness and it also acknowledges the fact that employees could experience psychological symptoms after an incident because of grief. However, the general focus of their model is on planning for damage to the physical infrastructure. When staff are included in the planning it appears to be only staff with defined roles and responsibilities for business continuity and disaster recovery.

Similar trends were revealed in the Chartered Management Institute's Business Continuity Management Surveys which cover a range of sectors in the UK. The surveys revealed that since 2007, the ability of organisations to provide remote access to employees who need to work from home increased; however the 2010 survey revealed that only 14% of organisations had encouraged remote working to help combat swine flu.[56] [57] [58] Furthermore, the 2011 survey revealed that only one in three organisations provide BCM training to non-specialist staff and a similar result was revealed in the 2007 and 2009 surveys.[59] [60] [61] The evidence would suggest that the involvement of staff in BCM did not improve during this time. Possibly as a direct result of this, many of the organisations involved in these surveys are also falling short on accommodating the needs of their staff in their BCM.

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[54] United Kingdom. Cabinet Office, 'A Summary of the 2014 Sector Resilience Plans', August 2014, https://www.gov.uk/government/publications/sector-resilience-plan-2014.

[55] Carolyn Castillo, 'Disaster Preparedness and Business Continuity Planning at Boeing: An Integrated Model', *Journal of Facilities Management* 3, no. 1 (2005): 8–26.

[56] United Kingdom. Chartered Management Institute, 'Disruption and Resilience: The 2010 Business Continuity Management Survey', March 2010, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/60839/cmi-disruption-resilience-2010.pdf.

[57] United Kingdom. Chartered Management Institute, 'A Decade of Living Dangerously: The Business Continuity Management Report 2009', March 2009, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/60840/cmibcm_2009.pdf.

[58] United Kingdom. Chartered Management Institute, 'Business Continuity Management', March 2007, http://www.ukcip.org.uk/wordpress/wp-content/CLARA/CMI_Business_Continuity_March_2007.pdf.

[59] United Kingdom. Chartered Management Institute, 'Managing Threats in a Dangerous World: The 2011 Business Continuity Management Survey', 2011, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/60838/cmi-disruption-resilience-2011.pdf.

[60] United Kingdom. Chartered Management Institute, 'A Decade of Living Dangerously: The Business Continuity Management Report 2009'.

[61] United Kingdom. Chartered Management Institute, 'Business Continuity Management'.

As a final example, IBM, a key component organisation of the communications sector, produced a guidance document entitled 'Business continuity: how to increase workforce resiliency during disasters'.[62] Although the document does acknowledge the need to communicate effectively with staff, the need to allow staff to communicate with family members and the importance of managing the emotional implications associated with trauma, it does not mention the possibility of staff refusing to report to work due to fear or other concerns. Further, despite extensive guidance about remote access technology and alternative/recovery sites, it does not acknowledge any potential staff issues related to these interventions. It should be noted that the IBM document was published as an example of the corporate resilience service that the company offers. As such, it is not clear whether the organisation actually follows its own recommendations. What is clear, however, is that in all these examples the main focus is on staff being unable to report to work as a result of being directly impacted by the incident or when transport or childcare is unavailable. The issue of staff being unwilling to report to work and discussions about strategies for increasing staff willingness to report to work appear to have been overlooked.

In summary, the outcomes of the two financial services Resilience Benchmarking surveys and trends seen across other sectors of national infrastructure have highlighted two key areas of interest that will be addressed in this PhD project. First, there appears to be a lack of attention to the needs of staff in crisis management and business continuity planning, an issue that will be examined further through qualitative interviews. Second, the crisis management and business continuity plans of organisations make certain assumptions about their employees' behaviour during a crisis. This research will address whether or not these assumptions are accurate through interviews, a survey and focus groups with employees from national infrastructure organisations operating in a variety of sectors. The findings of this research will be discussed in relation to a number of relevant psychology theories. Following this, recommendations for business continuity professionals based on the outcomes of the research will be presented.

[62] IBM Global Technology Services, 'Business Continuity: How to Increase Workforce Resiliency during Disasters', November 2011, http://www-01.ibm.com/common/ssi/cgi-bin/ssialias?infotype=SA&subtype=WH&htmlfid=BUW03015USEN.

Theoretical Approaches

The theories used in the design of this research, as well as in the analysis, have their roots in health psychology, social psychology and organisational psychology. These theories have been used to explain the phenomenon of staff willingness to report to work during high-impact, low-probability events. When studying something as complex as human behaviour, which has such a variety of potential influences, it is not just an advantage to draw on a variety of psychological theories but a necessity.

Risk Perception

Employee perceptions of risk are likely to influence their psychological and behavioural responses in the aftermath of a serious incident. These perceptions have a role to play in their individual decisions whether or not to return to work. The interactions between the risk perceptions and behaviour of the public have previously been linked to the ability of governments and government agencies to respond to extreme events or disasters; however this is also something that could apply to the ability of organisations from other sectors of national infrastructure to respond to and recover from these events.[63] [64] [65] To examine these issues in more detail it is important to understand how members of the public evaluate the risks in the world around them.

Slovic et al. argue that risk perception is dealt with in three main ways: 1) Risk as feelings – using fast, intuitive reactions to danger; 2) Risk as analysis – using logic, reason and scientific deliberation for hazard management; and 3) Risk as politics – when our instincts and scientific analysis conflict in our minds.[66] Members of the public primarily use 'risk as feelings' to evaluate risks, which leads them to undertake everyday risk analysis automatically and instinctively, basing many of their assessments on 'gut feelings'. The term 'affect' is used to

[63] M. Brooke Rogers and Julia M. Pearce, 'Risk Communication, Risk Perception and Behavior as Foundations of Effective National Security Practices', in *Strategic Intelligent Management*, 1st ed. (Elsevier Butterworth-Heinemann, 2013), 66–74.
[64] Steven M. Becker, 'Emergency Communication and Information Issues in Terrorist Events Involving Radioactive Materials', *Biosecurity and Bioterrorism: Biodefence Strategy, Practice, and Science* 2, no. 3 (July 2004): 195–207.
[65] George M. Gray and David P. Ropeik, 'Dealing with the Dangers of Fear: The Role of Risk Communication', *Health Affairs* 21, no. 6 (November 2002): 106–16.
[66] Paul Slovic et al., 'Risk as Analysis and Risk as Feelings: Some Thoughts about Affect, Reason, Risk, and Rationality', *Risk Analysis* 24, no. 2 (April 2004): 311–22.

refer to the conscious or unconscious feeling of 'goodness' or 'badness' associated with a stimulus that individuals use in order to make judgements about risk. [67] [68] Although people do use strong emotions such as fear and anger to make risk perceptions, usually 'risk as feelings' is reliant on more subtle emotions.[69] Risk perceptions using affective responses are more efficient because they occur automatically, often without the need for weighing up pros and cons or remembering relevant examples.[70] [71] However, when an individual experiences a new risk, for example a CBRN terrorist threat, they have to search through their memory for similar risks (e.g. infectious diseases, nuclear power), and make use of the positive or negative feelings associated with those more familiar risks.[72] Risk perceptions formed as a result of these generalisations are likely to be inaccurate.

An individual's reliance on positive or negative feelings to perceive risks is known as the 'affect heuristic'. Using an immediately available affective perception of a risk is not always helpful, especially if it is based on inaccurate knowledge or generalising from what is deemed similar stimuli. Individuals are known to underestimate and overestimate risks, which can have consequences as these judgements can affect their behaviour.[73] For example, during the anthrax attacks that took place in the US in 2001 many people believed that they had been exposed to anthrax even when they had not been in contact with the spores. [74] It is possible, therefore, that they could have been overestimating the risk to their personal health which could be a reason why many unexposed people reported being 'very upset' in the immediate aftermath.

A similar over-reaction was evident in the aftermath of the radiological accident in *Goiânia,* Brazil.[75] The incident involved a small amount of caesium-137 being stolen from an abandoned healthcare facility, which was later shared around the community by people who wanted to

[67] Ian Bateman et al., 'The Affect Heuristic and the Attractiveness of Simple Gambles', *Journal of Behavioral Decision Making* 20 (January 2007): 365–80.
[68] Slovic et al., 'Risk as Analysis and Risk as Feelings'.
[69] Paul Slovic and Ellen Peters, 'Risk Perception and Affect', *Current Directions in Psychological Science* 15, no. 6 (December 2006): 322–25.
[70] Bateman et al., 'The Affect Heuristic'.
[71] Daniel Kahneman, 'A Perspective on Judgment and Choice: Mapping Bounded Rationality', *The American Psychologist* 58, no. 9 (September 2003): 697–720.
[72] M. Brooke Rogers et al., 'Mediating the Social and Psychological Impacts of Terrorist Attacks: The Role of Risk Perception and Risk Communication', *International Review of Psychiatry* 19, no. 3 (January 2007): 279–88.
[73] Sarah Lichtenstein et al., 'Judged Frequency of Lethal Events', *Journal of Experimental Psychology: Human Learning and Memory* 4, no. 6 (November 1978): 551–78.
[74] North et al., 'Exposure to Bioterrorism'.
[75] IAEA (International Atomic Energy Agency), 'The Radiological Accident in Goiania' (Vienna: IAEA, 1988), http://www-pub.iaea.org/MTCD/Publications/PDF/Pub815_web.pdf.

show the glowing substance to their family and friends.[76] The incident resulted in 4 deaths and 260 people being contaminated. However, due to the widespread fear caused by radiation it also resulted in more than 112,000 people seeking examination and reassurance. Despite the fact they had not been exposed to any radiation, members of the public were experiencing stress-induced symptoms similar to the symptoms of radiation poisoning.[77] This last example clearly illustrates the fact that a public over-response to an incident due to misperceptions of the risks involved could put a serious and unnecessary strain on healthcare facilities. Alternatively, familiarity with a risk can lead to an under reaction which can also impact health outcomes. Take, for example, an outbreak of a novel influenza virus, a scenario in which members of the public may recall their past experiences of milder strains of influenza. They may also recall that their recovery did not require medication. In the event of a more serious strain of the virus, these recollections could result in individuals not taking their symptoms seriously enough or not taking the recommended protective actions.

Due to this potential for individuals to under or overestimate risk, it is important to understand how the public estimate the threat a particular risk poses to them. Research in this area has discovered a number of qualitative attributes individuals use to assess the potential risks of a stimuli or activity. The following factors are deemed important:

- Is the risk voluntary or involuntary?
- Are the effects immediate or delayed?
- Is the risk known or unknown to those exposed?
- Is it considered controllable or uncontrollable?
- Is the risk new/unfamiliar or old/familiar?
- Is the risk chronic or catastrophic?
- Is it a common risk (one people have learned to live with) or one that causes feelings of dread?
- How serious are the consequences – certain to be fatal or not certain to be fatal?[78]

Those risks that are deemed uncontrollable, unfamiliar, catastrophic, cause feelings of dread, could be potentially unknown to those exposed and that have serious consequences in terms of causing death are the ones that cause the greatest level of concern for individuals. Incidents involving a CBRN hazard can score very highly on these qualitative attributes and so are likely

[76] Becker, 'Emergency Communication and Information Issues'.
[77] Rogers et al., 'Mediating the Social and Psychological Impacts of Terrorist Attacks'.
[78] Baruch Fischhoff et al., 'How Safe Is Safe Enough? A Psychometric Study of Attitudes towards Technological Risks and Benefits', *Policy Sciences* 9 (April 1978): 127–52.

to cause high levels of fear if an incident of this type were to occur. This theory is supported by findings of prospective scenario studies which have shown that the type of incident has an effect on healthcare workers' willingness to report to work.[79] For example, Chaffee concluded that healthcare workers might be more willing to report to duty in weather disasters or mass-casualty incidents than in CBRN incidents.[80] Similarly, in a study of frontline health workers, 78% said they would be willing to report during a weather related event compared to 67% in an influenza pandemic and 52% in a bioterrorism event.[81] Therefore, there remains a degree of uncertainty about the numbers of healthcare workers who would report to work during a public health emergency, because the levels of willingness appear to vary greatly by incident type. It would seem that there is less willingness to report to work during incidents involving a contagious disease or contaminant due to the increased risk the healthcare workers face in these situations. The less familiar, more complex incidents (in terms of the hazards involved) such as CBRN terrorism are potentially more fear-inducing than natural disasters or explosions.[82]

Burns and Slovic also compared public risk perception and likely behaviour for a number of different threat scenarios and found that:

i) There was more concern for terrorist attacks than accidents.

ii) There was more concern for infectious disease than explosions.

iii) The use of suicide with an expressed motive to spread fear heightens the perception of risk.[83]

They also reported that risk perception was a good predictor of inclination to avoid public places or leave the area until the threat is over. It should be noted, however, that this study sampled only students in the US, so whether it can be generalised to the wider public is questionable, as is the fact that it took place very close to the anniversary of the September

[79] K. Qureshi et al., 'Health Care Workers' Ability and Willingness to Report to Duty During Catastrophic Disasters', *Journal of Urban Health: Bulletin of the New York Academy of Medicine* 82, no. 3 (September 2005): 378–88.
[80] Mary Chaffee, 'Willingness of Health Care Personnel to Work in a Disaster: An Integrative Review of the Literature', *Disaster Medicine and Public Health Preparedness* 3, no. 1 (March 2009): 50.
[81] Kristy Hope et al., 'Willingness of Frontline Health Care Workers to Work During a Public Health Emergency', *The Australian Journal of Emergency Management* 25, no. 3 (July 2010): 41.
[82] Erin C. Smith, Frederick M. Burkle Jr., and Frank L. Archer, 'Fear, Familiarity, and the Perception of Risk: A Quantitative Analysis of Disaster-Specific Concerns of Paramedics', *Disaster Medicine and Public Health Preparedness* 5, no. 1 (March 2011): 50.
[83] William J. Burns and Paul Slovic, 'Predicting and Modelling Public Response to a Terrorist Strike', Non-published Research Reports, Paper 145, (2009), http://research.create.usc.edu/nonpublished_reports/145.

11th attacks – potentially at a time of heightened fears for terrorism. Nonetheless, the findings have clear implications for organisations. Those incidents that cause more concern such as terrorist attacks, infectious disease outbreaks and suicide attacks are more likely to cause people to avoid the affected area or public places in general meaning they may be unwilling to leave their homes and report to work. It is vital that business continuity managers are aware of the influence that employees' risk perceptions can have on their behavioural responses during serious incidents.

Business continuity managers may perceive the same incident in a different way to the majority of the staff at an organisation. Past research has discussed the idea that whereas the *public* base their risk perceptions on feelings or 'affect', *experts* assess risk in an entirely different way. Slovic et al. argue that experts analyse the risks in the world around them using logic, reason and scientific deliberation.[84] Experts are more likely to calculate the probability of an incident occurring and to make use of scientific information about the likely consequences of the event prior to making any judgments or behavioural decisions. The public, or in this case staff, would be more likely to rely on their gut feelings to make these decisions and are less likely to perform a cost-benefit analysis. These findings have clear implications in an organisational setting. It is possible that business continuity managers are making assumptions about staff behaviour based on their own perceptions of risk. However, due to the varied skills and experience of business continuity managers in national infrastructure organisations, it is also important to mention that they will not all be 'experts' in the scientific nature of the risks but they should be considered experts in their organisation's response and recovery.

In summary, the risk perceptions of members of the public inform their behavioural responses to extreme events. Similarly, the risk perceptions of employees' during and in the aftermath of a serious incident such as a CBRN terrorist attack are likely to inform their behavioural responses and in particular their willingness to report to work. It is therefore vital to understand: (i) if risk perceptions can influence the decisions of employees in response to extreme events; (ii) how risk perceptions can influence the decisions of employees in response to extreme events, and (iii) how an organisation's risk communication can be informed by risk perception theories in order to promote desired behaviours in its staff. This research is the first to apply risk perception theory to the topic of willingness to work. It is also the first to examine how effective risk communication could be used to increase the likelihood that staff will report to work.

[84] Slovic et al., 'Risk as Analysis and Risk as Feelings'.

An aspect of risk perception not evaluated explicitly in the present research is cost-benefit analysis. This element of risk perception has been previously applied to public perceptions of technological risks, with individuals making quantitative judgements of perceived risk, acceptable risk and perceived benefit for a list of activities and technologies (e.g. skiing and nuclear power).[85] Although the perceived costs and benefits of reporting to work are not measured quantitatively in this research, discussions about the concerns and behavioural intentions of employees in the focus group study reported in Chapter 5 were designed in a way that would facilitate participants to discuss their perceptions of the benefits and risks, the pros and cons, of reporting to work. It would be useful for future research to take this one step further and ask employees to rate the costs and benefits of reporting to work for a variety of scenarios on a numerical scale.

Risk Communication

Risk communication is widely recognised as an important tool for sharing information and informing behaviour. In the case of a serious incident, such as one involving a CBRN hazard, effective risk communication has the potential to inform and prepare individuals. This can improve the likelihood of individuals taking appropriate protective actions and thus result in fewer fatalities.[86] Becker has suggested that in an emergency with a CBRNe element, people's behaviour could be influenced if they are given clear, scientifically accurate advice.[87] This can enable the public to be fully prepared for potential risks so that they can protect themselves and their families.

There are many real world examples of effective risk communication. However, there are also examples of when risk communication has not gone to plan and, as a result, has influenced behaviour in an unhelpful way. These real world examples highlight the importance of risk communication and provide evidence of situations where ineffective risk communication had, or could have had, serious consequences. Ineffective risk communication is primarily due to a lack of information, inaccurate information being provided, or the public misunderstanding that information. For instance, in the case of anthrax incident on Capitol Hill some workers thought they had heard media reports containing warnings not to take antibiotics for more than a few days because they could become immune to them, which led to some workers only

[85] Fischhoff et al., 'How Safe Is Safe Enough?'.
[86] James M. Acton, M. Brooke Rogers, and Peter D. Zimmerman, 'Beyond the Dirty Bomb: Re-Thinking Radiological Terror', *Survival* 49, no. 3 (2007): 151–68.
[87] Becker, 'Emergency Communication and Information Issues'.

taking the medication for two or three days instead of the two to three months they were prescribed for.[88]

Similarly, it was reported that after the Three Mile Island nuclear accident the most frequent reasons given by residents for why they chose to evacuate the area was that the information they were given was confusing; residents were initially advised to evacuate the area, but this recommendation was later rescinded.[89] The 1995 Tokyo subway sarin attacks were also impacted by poor communication. For example, staff at the main receiving hospital were told by the Fire Department that the cause of the symptoms they were seeing was acetonitrile, when it was in fact sarin.[90] Further, the information given to the public was misleading and false announcements were given out on the trains, which confused not just the passengers but also the responders.[91] Finally, miscommunication during the events of September 11th could have had very serious consequences for staff involved. An eyewitness described being in the South Tower during the incident and being instructed over the tannoy system that there had been an isolated fire in the North Tower and they need not evacuate. Fortunately, the individual ignored this message and continued to evacuate, a decision that ultimately saved his life.[92] These examples show the need to provide clear and accurate information to staff, as inaccurate information or information that is potentially ambiguous has the potential to cause, at best, unhelpful behaviour and at worst, fatalities.

In contrast, risk communication has also been shown to be helpful in real incidents. It can be used during and after an incident so that employees know what to do. For example, during the 2001 anthrax attacks in the US, the American Airlines' communications strategy was considered a success due to the variety of different communication methods utilised by the organisation.[93] More than 30 print publications, 20 email publications, 70 different web newsletters and 12 managerial phone hotlines were used by airline communicators to reach current employees, retirees, airline customers and the financial community. However, it is not

[88] North et al., 'Capitol Hill Workers' Experiences', 83.
[89] Houts, Cleary, and Hu, *The Three Mile Island Crisis: Psychological, Social, and Economic Impacts on the Surrounding Population*, 22.
[90] Tetsu Okumura et al., 'The Tokyo Subway Sarin Attack: Disaster Management, Part 2: Hospital Response', *Academic Emergency Medicine* 5, no. 6 (2008): 621.
[91] Robyn Pangi, 'Consequence Management in the 1995 Sarin Attacks on the Japanese Subway System' (John F. Kennedy School of Government, Harvard University, February 2002), 23.
[92] Mike Shillaker, 'American's Day of Terror: Eyewitness', *BBC News Online*, accessed 30 November 2014, http://news.bbc.co.uk/hi/english/static/in_depth/americas/2001/day_of_terror/eyewitness/3.stm.
[93] Downing, Joe R., 'American Airlines' Use of Mediated Employee Channels after the 9/11 Attacks', *Public Relations Review* 30, no. 1 (March 2004): 38.

just the method of communication that is important; the content of the messages can influence the psychological and behavioural responses of individuals during a serious incident.

Research has used focus groups to examine public reactions and behavioural responses to hypothetical CBRN incidents. Some of the most prominent and influential research in this area was conducted as part of the two year Pre-Event Message Development Project, which in addition to cognitive response interviews, included 79 focus groups with 884 participants.[94] [95] The focus groups revealed that in the event of a CBRN terrorist attack, the public respond to:

i) Clear and accurate information.

ii) Practical, concrete action steps.

iii) Consistent, simple messages.[96]

Participants also wanted information related to the response, such as whether the incident could happen again and how long the emergency would last.[97] Similarly, Wray and Jupka reported that in the event of a terrorist attack involving plague, the public wanted specific information that would allow them to take the necessary actions to protect themselves and their families and about how to seek treatment.[98] The participants also wanted messages to be clear, accurate and presented in plain English. The need for specific information about protective actions was also reported by Henderson et al., who also found that in response to a hypothetical VX attack the public wanted detailed medical facts about exposure and treatment.[99] These findings have implications in terms of the content of the messages organisations send to their staff during a serious incident. It is probable that similar principles apply to industrial/organisational communication during a CBRN event.

[94] Ricardo J. Wray et al., 'Communicating with the Public about Emerging Health Threats: Lessons from the Pre-Event Message Development Project', *American Journal of Public Health* 98, no. 12 (December 2008): 2214–22.
[95] Becker, 'Emergency Communication and Information Issues'.
[96] Wray et al., 'Communicating with the Public about Emerging Health Threats: Lessons from the Pre-Event Message Development Project'.
[97] Becker, 'Emergency Communication and Information Issues'.
[98] Ricardo Wray and Keri Jupka, 'What Does the Public Want to Know in the Event of a Terrorist Attack Using Plague?', *Biosecurity and Bioterrorism: Biodefense Strategy, Practice, and Science* 2, no. 3 (September 2004): 208–15.
[99] J. Neil Henderson et al., 'Chemical (VX) Terrorist Threat: Public Knowledge, Attitudes, and Responses', *Biosecurity and Bioterrorism: Biodefence Strategy, Practice and Science* 2, no. 3 (September 2004): 224–28.

Pearce et al. have also used focus groups to examine public reactions and information needs during a hypothetical incident involving an RED.[100] The study examined the public's existing levels of knowledge, risk perception, understanding of existing risk communication and in light of this information, their intended behaviour. Based on the findings of these focus groups the researchers were able to design new risk communication messages and test these with further focus groups. The findings revealed that by providing accurate information, researchers were able to improve participants' understanding of the actual risks to their health. This increased level of knowledge resulted in participants being less likely to report that they would attend a healthcare/monitoring facility, something that would be unnecessary for those who had not been in the affected area. It also led to participants questioning some of the information they had seen in a media report because it contradicted the information they had read in the official leaflet. This is something that would be extremely useful in a real incident when one considers the potentially wide range of different information sources available to the public and the so called 'experts' who would be giving their opinion in the media. Employers should keep in mind that by pointing staff in the direction of the official Government communication, their employees will be less likely to be influenced by potentially inaccurate information, such as what they may read on social media.

It is vital that employers provide their staff with accurate information concerning the risks they could face by going to work, keeping in mind that without the facts employees could be under or overestimating the risks to their health and that of their significant others. In a study of student nurses, it was found that the students' concerns for safety (self and family) were based on inaccurate knowledge about some of the agents concerned.[101] In fact when asked to consider an inhalational anthrax incident, 80% of the student nurses were concerned about their own safety and 75% were concerned for their family's safety, when in reality anthrax is non-contagious from human-to-human. Furthermore, with regards to treating victims of a chemical incident who had been decontaminated, 54% were concerned for themselves and 58% were concerned for their families. The student nurses in the study seemed to be unaware that there would be little or no risk to themselves or their families when treating a patient who had already been decontaminated. However, it must be noted that this study was conducted using a relatively small sample of student nurses (n=95) which means that the results must be

[100] Julia M. Pearce et al., 'Communicating with the Public Following Radiological Terrorism: Results from a Series of Focus Groups and National Surveys in Britain and Germany', *Prehospital and Disaster Medicine* 28, no. 2 (April 2013): 110–19.
[101] Charlotte F. Young and Deborah J. Persell, 'Biological, Chemical, and Nuclear Terrorism Readiness: Major Concerns and Preparedness of Future Nurses', *Disaster Management & Response* 2, no. 4 (October 2004): 112.

generalised to the wider nursing population with caution, particularly those with more experience and training. Nonetheless, the study shows just how vital accurate information would be in the event of a serious but unfamiliar incident such as a CBRN terrorist attack, particularly when one considers the potentially low levels of knowledge employees could have of the agents involved.

A final aspect of risk communication that needs to be considered in the present discussion is trust. Academics have frequently discussed the role that trust plays in both the acceptability of risks and the believability of risk communication.[102] [103] [104] [105] [106] Both the public and employees of an organisation need to trust not only the content of the information but also the provider of that information, whether this is an organisation, an individual spokesperson, an independent expert or an employee's own line manager. Pearce et al., in their focus group study of public reactions to a radiological exposure device (RED) terrorist incident, found that the participants were generally sceptical of the media due to perceived scaremongering in the past but were generally trusting of a non-governmental scientist.[107] Similarly, Pearce et al., in their survey study examining public risk communication following a chemical spill found that the extent to which the public trusted the authorities giving the advice directly influenced their intention to comply with the recommendation to shelter in place.[108] Therefore, if individuals do not trust the organisation or person that is presenting the information or advice to them, it could mean that they adopt unhelpful behaviours or that they refuse to follow recommendations which are designed to protect their health.[109] In light of these findings it is important to understand how authorities' inaccurate assumptions about public behaviour during emergencies can inform risk communication in an unhelpful way, further fostering public feelings of distrust.

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[102] Paul Slovic, 'Trust, Emotion, Sex, Politics, and Science: Surveying the Risk-Assessment Battlefield', *Risk Analysis* 19, no. 4 (August 1999): 689–701.
[103] P. Slovic, J. H. Flynn, and M. Layman, 'Perceived Risk, Trust, and the Politics of Nuclear Waste', *Science* 254, no. 5038 (December 1991): 1603–7.
[104] Rogers and Pearce, 'Risk Communication, Risk Perception and Behavior'.
[105] Thomas A. Glass and Monica Schoch-Spana, 'Bioterrorism and the People: How to Vaccinate a City against Panic', *Clinical Infectious Diseases* 34, no. 2 (January 2002): 217–23.
[106] G. James Rubin, Alexander K. Chowdhury, and Richard Amlôt, 'How to Communicate with the Public About Chemical, Biological, Radiological, or Nuclear Terrorism: A Systematic Review of the Literature', *Biosecurity and Bioterrorism: Biodefense Strategy, Practice, and Science* 10, no. 4 (December 2012): 383–95.
[107] Pearce et al., 'Communicating with the Public Following Radiological Terrorism'.
[108] Julia M. Pearce et al., 'Communicating Public Health Advice After a Chemical Spill: Results From National Surveys in the United Kingdom and Poland', *Disaster Medicine and Public Health Preparedness* 7, no. 1 (February 2013): 65–74.
[109] Rogers and Pearce, 'Risk Communication, Risk Perception and Behavior'.

Behavioural Assumptions

Governments and organisations often make assumptions about the behaviour of individuals during extreme events. Rogers and Pearce suggest that some of the distrust the public have in the authorities is possibly a result of information being withheld from the public during past incidents.[110] This may have occurred because authorities designed their risk communication materials based on an assumption that the public would panic if they knew the full extent of the situation, an assumption that we now know is largely unfounded. Although 'panic' is a commonly used term in the media and in the emergency planning world to this day, many academics do not agree that the public is prone to panic in emergency situations. Consequently many articles have been written and theories proposed that dispute this idea.[111] [112] [113] A main area of contention is the fact that data collected from survivors of real incidents do not support the idea of 'mass panic' and there are few examples of antisocial behaviour occurring.[114] [115] In fact, research shows that people are more likely to behave in an altruistic manner, even towards strangers, and even in life-threatening situations.[116] Despite these findings, past academic research has revealed emergency responders frequently hold the inaccurate view that the public will panic during an emergency situation and will not follow instructions.[117] [118] These inaccurate assumptions have informed planning in an unhelpful way and in an emergency this could result in information being withheld, which could result in a less effective response.[119] These findings have implications for the ways in which organisations communicate with their employees during extreme events. Organisations should not withhold information from the public (i.e. their customers) or from their own staff, as this may lead to them not being viewed as a trusted source of information in the future.

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[110] Ibid.

[111] John Drury, Chris Cocking, and Steve Reicher, 'Everyone for Themselves? A Comparative Study of Crowd Solidarity among Emergency Survivors', *British Journal of Social Psychology* 48, no. 3 (September 2009): 487–506.

[112] John Drury, Chris Cocking, and Steve Reicher, 'The Nature of Collective Resilience: Survivor Reactions to the 2005 London Bombings', *International Journal of Mass Emergencies and Disasters* 27, no. 1 (March 2009): 66–95.

[113] Ben Sheppard et al., 'Terrorism and Dispelling the Myth of a Panic Prone Public', *Journal of Public Health Policy* 27, no. 3 (2006): 219–45.

[114] Ibid.

[115] Drury, Cocking, and Reicher, 'Everyone for Themselves?'.

[116] Chris Cocking, John Drury, and Steve Reicher, 'The Psychology of Crowd Behaviour in Emergency Evacuations: Results from Two Interview Studies and Implications for the Fire and Rescue Services', *Irish Journal of Psychology: Special Edition: Psychology and the Fire and Rescue Services* 30, no. 1–2 (2009): 59–73.

[117] Julia M. Pearce et al., 'CIE Toolkit WP8: Risk and Crisis Communication Requirements Following a Chemical Incident or Emergency. Unpublished Report to the European Commission', 2011.

[118] Holly Elisabeth Carter et al., 'Emergency Responders' Experiences of and Expectations Regarding Decontamination', *International Journal of Emergency Services* 3, no. 2 (October 2014): 179–92.

[119] Rogers and Pearce, 'Risk Communication, Risk Perception and Behavior'.

In addition to organisations making assumptions about how the public will behave, it is also important to mention that members of the public can also make assumptions about emergency response. Research in this area has found evidence that public expectations of what *should* happen during an incident can lead to an under-response on the part of the public. For example, Pearce et al. in their study of public responses to a hypothetical RED incident found that participants were falsely reassured by the response of the authorities, because they believed they would be quarantined or there would be a larger police cordon area if there was really a risk of radiation.[120] This assumption caused them to believe it was a 'scare story' and because of this most participants said they would not alter their behaviour. The implication of these findings in an organisational setting is that employees may make assumptions about their employer's response during an extreme event. If there is a discrepancy between what employees expect of their organisation and what their organisation actually provides, it may result in employees experiencing negative feelings towards their employer. For example, if employees expect there to be masks provided during an infectious disease outbreak and the organisation does not provide these, then employees may feel the organisation is not taking their safety seriously enough. Employers will therefore need to provide accurate, technical information in order to justify why they are providing certain interventions, or perhaps more importantly, why they are not.

To add to this discussion, Drury has suggested that in an emergency, individuals should be armed with information to help them survive.[121] This idea goes against traditional views that people process information less efficiently under stress by proposing that keeping individuals informed will actually reduce their stress and allow them to act efficiently. Furthermore, it has been suggested that in the event of a CBRN incident there are likely to be low levels of knowledge amongst the general public causing an 'information void' to occur.[122] This is something that Barnett et al. believe would do nothing to reduce feelings of dread, and is likely to affect an employee's decision whether or not to report to duty.[123] Therefore, it is vital that organisations are honest and accurate when providing their staff with information in the event of a serious incident, particularly one that is unfamiliar such as a CBRN incident, as it has the potential to directly affect rates of staff absenteeism. The present research has examined these issues further, specifically the influence of different sources of information on employee

[120] Pearce et al., 'Communicating with the Public Following Radiological Terrorism'.
[121] John Drury, 'Managing Crowds in Emergencies: Psychology for Business Continuity', *Business Continuity Journal* 3, no. 3 (2009): 14–24.
[122] Daniel J. Barnett et al., 'Applying Risk Perception Theory to Public Health Workforce Preparedness Training', *Journal of Public Health Management and Practice: JPHMP* Suppl (November 2005): S35.
[123] Ibid.

perceptions and behavioural intentions, as well as getting useful feedback from employees on their likely information needs during a CBRN incident. The information employees receive during an incident has the potential to influence their behavioural responses. However there are also other factors that could influence their willingness to report to work, such as their beliefs about the seriousness of the threat they are faced with and the extent to which they can do something to protect themselves against that threat.

Extended Parallel Process Model

The Extended Parallel Process Model (EPPM) is a model which other academic researchers have found to be useful in understanding how healthcare providers' perceptions of threat and efficacy may influence their willingness to work during an influenza pandemic.[124] [125] [126] [127] The model suggests that when individuals perceive a threat they assess the 'perceived severity', which is their belief about the seriousness of the threat, and the 'perceived susceptibility', which is their belief about their own chances of experiencing the threat.[128] The efficacy part of the model is separated into 'perceived response efficacy', which is the individual's belief as to whether the response can prevent the threat, and 'perceived self-efficacy', which is their belief in their own ability to perform the recommended response. The EPPM was originally designed as a theory to explain why some fear appeals fail; either when the appeals do not elicit the desired health behaviour in the public or the public simply reject the messages. Witte devised the EPPM after the previous leading theory, Protection Motivation Theory (PMT), in his opinion, failed to sufficiently explain the empirical data and the specific factors leading to the message rejection in fear appeals.[129] [130] The EPPM has been selected for inclusion in the present research as an alternative to PMT due to its previous successful application to the topic of willingness to work; however it should be noted that the two theories are very similar.

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[124] Kim Witte, 'Putting the Fear Back into Fear Appeals: The Extended Parallel Process Model', *Communication Monographs* 59, no. 4 (December 1992): 329–49.
[125] Daniel J. Barnett et al., 'Assessment of Local Public Health Workers' Willingness to Respond to Pandemic Influenza through Application of the Extended Parallel Process Model', *PLoS ONE* 4, no. 7 (July 2009): e6365.
[126] Ran D. Balicer et al., 'Characterizing Hospital Workers' Willingness to Report to Duty in an Influenza Pandemic through Threat- and Efficacy-Based Assessment', *BMC Public Health* 10 (July 2010): 436.
[127] Daniel J. Barnett et al., 'Gauging U.S. Emergency Medical Services Workers' Willingness to Respond to Pandemic Influenza Using a Threat- and Efficacy-Based Assessment Framework', *PLoS ONE* 5, no. 3 (March 2010): e9856.
[128] Witte, 'Putting the Fear Back into Fear Appeals'.
[129] Ibid.
[130] Ronald W. Rogers, 'A Protection Motivation Theory of Fear Appeals and Attitude Change', *The Journal of Psychology* 91, no. 1 (September 1975): 93–114.

Both the EPPM and PMT contain the elements of perceived threat and perceived efficacy; however, the EPPM puts more emphasis on the emotional response of fear people experience in reaction to a perceived threat. For example, when an individual believes that a threat is serious and that they are susceptible to it, their fear will motivate them to take action.[131] In terms of perceived efficacy, people can become motivated to control the danger that a specific threat poses to them or to control their fear about that threat. However, they are only likely to take the recommended action if they believe they are able to do so. If they do not believe they are able to take the recommended action or the action does not work then Witte and Allen suggest that people will be more likely to try to control their fear using unhelpful coping strategies such as denial (i.e. a belief that it will not happen to them), defensive avoidance (i.e. individuals refuse to think about it because it is too frightening) or reactance (i.e. individuals might ignore the official message due to a belief they are being manipulated).[132]

Past research examining healthcare workers' behavioural intentions in the event of an influenza pandemic have discovered that the EPPM can be used to assess workers' willingness to respond. Specifically, Barnett et al. in their 2009 study reported that local health department employees who perceived the threat of a pandemic to be high (in terms of the likelihood of it occurring and its severity) and perceived their efficacy to be high (in terms of their ability to perform their duty and the impact they would have on combating the public health threat) were 31.7 times more likely to report being willing to respond to an influenza pandemic than those with low perceived threat and low perceived efficacy.[133] The authors note that efficacy is a stronger predictor of willingness than threat, although those individuals fitting a high threat/low efficacy profile were still three times more likely to be willing to respond than those fitting a low threat/low efficacy profile. Interestingly, a study with hospital workers revealed that although those fitting a high threat/high efficacy profile were significantly more likely to say they would be willing to report in a pandemic than those fitting a low threat/low efficacy profile, the specific 'threat' aspect had no significant impact on willingness; the high threat/high efficacy EPPM profile was not significantly different from the low threat/high efficacy profile in their willingness to respond.[134]

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[131] Kim Witte and Mike Allen, 'A Meta-Analysis of Fear Appeals: Implications for Effective Public Health Campaigns', *Health Education & Behavior* 27, no. 5 (October 2000): 591–615.
[132] Ibid.
[133] Barnett et al., 'Assessment of Local Public Health Workers' Willingness to Respond to Pandemic Influenza'.
[134] Balicer et al., 'Characterizing Hospital Workers' Willingness to Report to Duty in an Influenza Pandemic'.

In light of these findings, the research presented in this thesis has examined the willingness of employees of all sectors to report to work during a range of different hypothetical scenarios using the EPPM threat and efficacy assessment framework. Specifically, it has investigated the relative influences of the threat and efficacy variables on willingness, using a modified version of the EPPM. To my knowledge this is the first study to apply the EPPM framework to employees other than healthcare workers and with additional scenarios to pandemic, such as incidents involving CBRN hazards. The EPPM measure has been included in the web survey which is reported in Chapter 4 of this thesis.

Role Conflict

Related to the concepts of self-efficacy and response-efficacy are the perceptions an individual may hold about their role in the workplace. This could also take the form of a feeling of obligation, either to their job or to their family. It has long been recognised in the sociological literature the significance of individuals belonging to various social groups: families, friendship groups, employment groups, community groups and also society as a whole. One of the first and most widely cited articles to examine this multiple-group membership in disaster was Killian in 1952.[135] Killian suggested that in a disaster individuals experience a 'role conflict' between the roles they play in these different groups. Killian concluded that the biggest conflict is between the family and other groups. The author used the example of a ship explosion in Texas City and described how the majority of individuals who experienced a role conflict between the family and other groups resolved this in favour of loyalty to their families. After conducting interviews with people affected by the Texas City explosion and also people affected by tornados in three Oklahoma towns, Killian suggested that:

> Much of the initial confusion, disorder, and seemingly complete disorganization reported in the disaster communities was the result of the rush of individuals to find and rejoin their families.[136]

However, the concept of role conflict in disaster is not fully supported by Quarantelli, who found little evidence of its existence in his research.[137] In fact in the study of over 150 disaster events, which included 6000 interviews, Quarantelli reported that role conflict did not cause a

[135] Lewis M. Killian, 'The Significance of Multiple-Group Membership in Disaster', *American Journal of Sociology* 57 (January 1952): 309–14.
[136] Ibid., 311.
[137] E. L Quarantelli, 'Structural Factors in the Minimization of Role Conflict: A Re-Examination of the Significance of Multiple Group Membership in Disasters' (Columbus (OH): The Disaster Research Center, University of Delaware, 1978).

serious loss of manpower. The author proposed that structural shifts occur in disaster-impacted communities which reduce the potential role conflicts. A community can be described as a group of individuals striving to achieve multiple values. The shifts occur in an emergency situation because certain values become more critical, and subsequently the roles required to achieve these values become more important. Quarantelli commented that Killian's article tended to put the primary values that are central to an emergency response (e.g. caring for people, providing for their basic needs etc.) in opposition with other types of demands on the individual, such as occupational role expectations. Quarantelli notes that these values can be achieved in many ways and that some organisations are responsible for implementing these values (e.g. emergency relevant organisations). It is important to note that Killian focused on disasters for which there was little warning (explosion and tornados), and Quarantelli comments that disasters that occur without warning and have a widespread impact provide the optimum conditions for role conflict to occur. However, Quarantelli found no evidence of role conflict in his own study of these types of disasters. One significant point to note here is that Killian discussed the different groups and roles as separate concepts, whereas in reality it is likely these overlap considerably. Quarantelli makes two interesting points about this: first, that occupational performance is an important part of the role of being a father and a husband, and second, that in an emergency situation it is likely that other members of the family will take up the role of tending to immediate family and neighbours. However, it must be noted that Quarantelli's article was published over 30 years ago and since then gender roles have changed, and as such it is more likely that men and women are equally responsible for providing for their families financially, or that either gender could be a single parent, making the occupational roles of both genders' important.

More recent research into factors affecting the ability and/or willingness of healthcare workers to report to duty during an incident have repeatedly reported that fear or concern for family or significant others is a frequently cited reason for not being willing to report to work during an incident.[138] Healthcare workers face an additional source of stress, whereby caring for a patient with an infectious disease could potentially put their own health at risk and subsequently the health of their family. This stress can be caused by feelings of guilt about whether they should be risking their family's health for the profession.[139] Several studies have shown that one of the barriers to an individual's willingness to work is a concern for their

[138] Qureshi et al., 'Health Care Workers' Ability', 383.
[139] Tracey L. O'Sullivan et al., 'If Schools Are Closed, Who Will Watch Our Kids? Family Caregiving and Other Sources of Role Conflict among Nurses during Large-Scale Outbreaks', *Prehospital and Disaster Medicine* 24, no. 4 (August 2009): 322.

families and that a potential facilitating factor to return would be to provide protection or treatment to their significant others as well as themselves.[140] [141] In one study which asked hospital staff about their experiences during a fire disaster, participants mentioned negotiating with their spouses concerning their decision whether to stay at home or go to work; spouses wanted them to stay home for emotional and physical support.[142] When asked whether they would be prepared to work with victims who could transmit disease, student nurses' responses were influenced by whether their families would receive protection (prophylactic antibiotics) or vaccine.[143] In fact, 90% of the students said they would not be willing to work with contagious clients (where transmission to family was possible) if their family was not provided with prophylactic antibiotics. Note that in this study, family was defined as 'significant others', which also included friends and anyone who was highly significant to the individual.

Families are an important influence on the decisions an individual may make during and in the aftermath of an incident, and on their willingness to work during this time. This influence would most likely be stronger for incidents where there is a threat to the health of significant others, such as an infectious disease outbreak or risk of contamination from a noxious agent. However, it must be noted that not all studies have found a difference in willingness to work between those who have children and those who do not have children.[144] Although previous academic studies have examined the influence of families and significant others on the willingness of employees to report to work in for various hypothetical extreme events, this study will be the first to discuss these influences in relation to Role Conflict Theory.

Accounts of real incidents can also provide examples of family having an influence on return to work behaviour. For example, after the Three Mile Island (TMI) nuclear disaster in 1979 – the worst nuclear incident the United States had ever experienced – it was reported that role conflict was a source of tension for nuclear workers.[145] The TMI incident caused a large

[140] Gershon et al., 'Factors Associated with the Ability and Willingness of Essential Workers', 997.
[141] Young and Persell, 'Biological, Chemical, and Nuclear Terrorism Readiness', 112.
[142] Judy E. Davidson et al., 'Disaster Dilemma: Factors Affecting Decision to Come to Work during a Natural Disaster', *Advanced Emergency Nursing Journal* 31, no. 3 (September 2009): 251.
[143] Young and Persell, 'Biological, Chemical, and Nuclear Terrorism Readiness', 112.
[144] Charlene B. Irvin et al., 'Survey of Hospital Healthcare Personnel Response during a Potential Avian Influenza Pandemic: Will They Come to Work?', *Prehospital and Disaster Medicine* 23, no. 4 (July 2008): 330.
[145] Rupert F. Chisholm, Stanislav V. Kasl, and Brenda Eskenazi, 'The Nature and Predictors of Job Related Tension in a Crisis Situation: Reactions of Nuclear Workers to the Three Mile Island Accident', *The Academy of Management Journal* 26, no. 3 (September 1983): 385–405.

number of residents to evacuate the area.[146] According to one estimate, 66% of those households within five miles of TMI had at least one person evacuate (although this only accounts to 1% of the total area population).[147] Although most of the evacuees reported staying with family and friends, they were often located far away, with over half reporting having travelled over 90 miles.[148] This is significant because mass-evacuation has the potential to cause substantial business disruption, especially when, due to their roles, staff are unable to complete their work remotely (e.g. bus drivers and bank cashiers). When residents who evacuated the TMI area were asked why they did so, the main reasons given were because they felt there was a danger and to protect their children.[149] Having young children in the house was one of the strongest predictors of evacuation. One study reported that vast majority of TMI nuclear workers indicated that during the incident they felt they needed to be in two places at once – at work and at home. However, this conflict was resolved in favour of work, with high proportions of TMI nuclear workers not evacuating because they felt they 'had to work'. After the anthrax attacks in the United States in 2001, families often added to employees' distress, requiring information and reassurance. For example, one mother of a worker made the worker promise never to go back into the building they worked in ever again.[150]

As most of the past studies included in the present thesis have found families to be an influence on willingness to work, they provide some support for Killian's original theory of role conflict; although as previously discussed, the roles are not as separate as his article suggests.[151] The recent research differs from the findings of Quarantelli potentially because the disasters he included did not involve an infectious agent or any CBRN element; therefore continuing to work in the disasters he studied would have been unlikely to put a worker's family at further risk.[152] The idea of role conflict has also been discussed away from the disaster literature and focuses on the idea that parents who care for children and who also work can experience role conflict in everyday life, whereby the two roles are perceived as somewhat incompatible. Research has shown this conflict to be a source of stress for many professionals,

[146] United States. President's Commission on the Accident at Three Mile Island, 'The Need for Change: The Legacy of TMI: Report of the President's Commission on the Accident at Three Mile Island.' (The Commission, 1979).
[147] Houts, Cleary, and Hu, *The Three Mile Island Crisis: Psychological, Social, and Economic Impacts on the Surrounding Population*, 13.
[148] Ibid.
[149] Houts, Cleary, and Hu, *The Three Mile Island Crisis: Psychological, Social, and Economic Impacts on the Surrounding Population*.
[150] North et al., 'Capitol Hill Workers' Experiences', 85.
[151] Killian, 'The Significance of Multiple-Group Membership in Disaster'.
[152] Quarantelli, 'Structural Factors in the Minimization of Role Conflict'.

having an effect on both psychological and physical health.[153] [154] [155] This is important because even if the role conflict does not affect an individual enough to cause them to stay away from work, the fact that it can cause psychological and physical symptoms means it cannot be ignored; experiencing these symptoms can have a negative effect on an individual's productivity levels at work. The issue of the influence on family and loved ones on return to work behaviour needs further clarification and the present thesis will examine the effect of these significant others on predicted willingness to work after an incident through its primary data collection.

As well as significant others having an effect on workers' *willingness* to report to work, they can also have a significant effect on their *ability* to go to work. Several studies report the availability of childcare as a potential barrier to employees returning to work after an incident.[156] [157] [158] [159] [160] In the event of a large scale incident it is likely that some school closures would occur. In some cases this might happen because the school is in a directly affected area, damaged by the incident, or in the instance of a pandemic, it could be closed as part of a country's mitigation strategy. One estimate states that in the UK about 16% of the workforce is likely to be the primary caregiver for their children (who still live at home); the cost of school closures as a result of work absenteeism could potentially be as high as £0.2bn to £1.2bn per week.[161] However, it is noted in the same article that it may be possible for individuals to arrange informal care for their children, or to work from home; but for how long these alternative arrangements could last is unclear. Furthermore, this estimate is based on solely the primary caregiver staying at home for practical reasons, and does not take into account the additional caregivers missing work because of concerns for the safety of their children, such as the fear of passing on an infection.

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[153] Jeffrey H. Greenhaus and Nicholas J. Beutell, 'Sources of Conflict between Work and Family Roles', *The Academy of Management Review* 10, no. 1 (January 1985): 76–88.
[154] Tammy D. Allen and Jeremy Armstrong, 'Further Examination of the Link Between Work-Family Conflict and Physical Health', *American Behavioral Scientist* 49, no. 9 (May 2006): 1204–21.
[155] Chantal Brisson et al., 'Effect of Family Responsibilities and Job Strain on Ambulatory Blood Pressure Among White-Collar Women', *Psychosomatic Medicine* 61, no. 2 (March 1999): 205–13.
[156] Qureshi et al., 'Health Care Workers' Ability', 383.
[157] Stergachis et al., 'Health Care Workers' Ability and Willingness to Report to Work During Public Health Emergencies', 303.
[158] Andrew L. Garrett, Yoon Soo. Park, and Irwin Redlener, 'Mitigating Absenteeism in Hospital Workers during a Pandemic', *Disaster Medicine and Public Health Preparedness* 3, no. Suppl 2 (December 2009): S142.
[159] Erin Smith et al., 'Paramedics' Perceptions of Risk and Willingness to Work during Disasters', *The Australian Journal of Emergency Management* 24, no. 3 (August 2009): 25.
[160] Gershon et al., 'Factors Associated with the Ability and Willingness of Essential Workers', 997.
[161] Md Z. Sadique, Elisabeth J. Adams, and William J. Edmunds, 'Estimating the Costs of School Closure for Mitigating an Influenza Pandemic', *BMC Public Health* 8 (2008): 135.

Further, in a study examining the return to work behaviour of staff in a local government organisation after a hypothetical earthquake, the researchers noted that having dependent children had less of an effect than predicted.[162] However, those with children in their household scored significantly higher on the item '*I would be more useful at home than at work after an earthquake'* than those with no children. It is unclear, however, why there was a difference; for example whether the parents agreed with the statement solely because of practicalities or whether other influences and emotions had a part to play.

Professional Obligations

During or after an incident that involves contagion or contamination, employees may have to put their lives at risk (or at least perceive themselves as doing so) to carry on working as normal. Adding another layer of complexity to personal risk assessment is the ethical or moral dilemma they may face: carry on working to for the sake of their organisation and colleagues or stop working to protect their health. Research in this area has mainly focused on the ethical dilemma healthcare providers face when deciding whether to put their own personal health at risk by reporting to duty and treating infected patients.[163] There exists a moral debate about the level of risk an individual should or would tolerate when they have an obligation or duty of care. Discussions in this area have taken place around Severe Acute Respiratory Syndrome (SARS) and pandemic influenza.[164] [165] [166] In the case of SARS, the illness was very serious, even in healthy young adults, and posed a genuine risk to the health of medical professionals treating infected patients.[167] Many healthcare workers were labelled as 'heroes' by the media for risking their own health to treat sick patients.[168] However, one must consider whether such acts are indeed heroism or simply fulfilment of a professional obligation. Some would argue that the specialist knowledge and ability of physicians means they have an obligation to help

[162] K. Smith and D. Walton, 'Returning to Work after the Big One: Predicting Staff Priorities in a Dual Role Agency', *International Journal of Emergency Management* 6, no. 2 (2009): 169.
[163] Abigail Zuger and Steven H. Miles, 'Physicians, AIDS, and Occupational Risk', *JAMA: The Journal of the American Medical Association* 258, no. 14 (October 1987): 1924.
[164] Lynette Reid, 'Diminishing Returns? Risk and the Duty to Care in the SARS Epidemic', *Bioethics* 19, no. 4 (August 2005): 348–61.
[165] Kelly A. Shaw et al., 'The GP's Response to Pandemic Influenza: A Qualitative Study', *Family Practice* 23, no. 3 (June 2006): 267–72.
[166] Carly Ruderman et al., 'On Pandemics and the Duty to Care: Whose Duty? Who Cares?', *BMC Medical Ethics* 7 (April 2006): 5.
[167] Monica Avendano, Peter Derkach, and Susan Swan, 'Clinical Course and Management of SARS in Health Care Workers in Toronto: A Case Series', *CMAJ: Canadian Medical Association Journal* 168, no. 13 (June 2003): 1649.
[168] Dena Hsin-Chen Hsin and Darryl R. J. Macer, 'Heroes of SARS: Professional Roles and Ethics of Health Care Workers', *Journal of Infection* 49, no. 3 (October 2004): 210.

when faced with a critical human need, even if personal risk is involved, and certain codes and principles of ethics have been published to address this issue in the medical profession.[169] However, codes and principles notwithstanding, it is still possible for a healthcare worker to refuse to report for duty, potentially believing that they may be putting their career on the line by doing so. During the SARS outbreak, there were examples of staff refusing to treat infected patients.[170] Singer at al. discuss the moral quandary of healthcare workers during the SARS outbreak, who

> ….were forced to weigh serious and imminent health risks to themselves and their families against their duty to care for the sick. This duty is mainly determined by professional ethics. By analogy, firefighters do not have the freedom to choose whether to face a particularly bad fire and police officers do not get to select which dark alleys they walk down.[171]

Further, in a study of healthcare workers in Singapore, it was reported that although the majority perceived a great personal risk of falling ill with SARS, they also accepted the risk as part of their job.[172] In the case of pandemic influenza, similar moral decisions are likely to have been made in GP surgeries and hospitals across the world. A prospective qualitative study of GPs in 2006 revealed a strong conviction that the abandonment of their responsibilities during a pandemic would be unethical and that taking care of their patients is what they signed up to do.[173] In a study examining willingness to work during an influenza pandemic, it was found that 64% of physicians disagreed with the statement *'It would be ethical for HCP [healthcare professionals] to abandon their workplace during a pandemic in order to protect themselves and their families'*, which compared to just 30% of administrators who disagreed with the same statement.[174] Similar results were reported by Seale et al. who found that ancillary/support staff were significantly more likely to be unsure of their intentions regarding reporting to work during a pandemic when compared to medical/nursing staff.[175] Therefore,

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[169] Chalmers C. Clark, 'In Harm's Way: AMA Physicians and the Duty to Treat', *The Journal of Medicine and Philosophy* 30, no. 1 (February 2005): 65–87.
[170] Sharon E. Straus et al., 'Severe Acute Respiratory Syndrome and its Impact on Professionalism: Qualitative Study of Physicians' Behaviour during an Emerging Healthcare Crisis', *BMJ* 329, no. 7457 (June 2004): 2.
[171] Peter A. Singer et al., 'Ethics and SARS: Lessons from Toronto', *BMJ* 327, no. 7427 (December 2003): 1343.
[172] David Koh et al., 'Risk Perception and Impact of Severe Acute Respiratory Syndrome (SARS) on Work and Personal Lives of Healthcare Workers in Singapore: What Can We Learn?', *Medical Care* 43, no. 7 (July 2005): 768.
[173] Shaw et al., 'The GP's Response to Pandemic Influenza', 3.
[174] Boris P. Ehrenstein, Frank Hanses, and Bernd Salzberger, 'Influenza Pandemic and Professional Duty: Family or Patients First? A Survey of Hospital Employees', *BMC Public Health* 6 (December 2006): 312.
[175] Holly Seale et al., '"Will They Just Pack up and Leave?" - Attitudes and Intended Behaviour of Hospital Health Care Workers during an Influenza Pandemic', *BMC Health Services Research* 9 (February 2009): 32.

the willingness of staff to put their personal safety at risk by working may vary by occupation or role. It is also unclear whether the sense of duty and consideration of professional ethics applies only to emergency/healthcare workers, or if employees of other organisations would also be confronted with a similar ethical dilemma when deciding whether or not to report to work. DiGiovanni et al. is the only study known at the present time to have directly compared healthcare/emergency workers and another working population, which, in addition to emergency responders, also included a group of local media workers, a group of spouses of responders and a group of residents in a prospective study of community reactions to bioterrorism.[176] It was found that: responders (95%) were the most likely to stay at work when compared to media (71%) and residents (65%); media workers and spouses showed the highest levels of fear; and media workers showed the lowest levels of understanding of medical issues surrounding the outbreak. However, it is unclear from the research whether it was the responders' sense of professional obligation that led to them being the most willing to remain working or whether it was their increased levels of knowledge.

Consequently, there is a need to examine this issue further, and this thesis will examine whether employees of national infrastructure organisations feel a sense of duty to continue to work in order keep their organisation running during a crisis. In addition to the possibility of employees' willingness to report to work being influenced by their role or profession, it is also possible that their behavioural responses are affected by organisational factors, such as how strongly they identify with their organisation or how satisfied they are with their job. Both of these factors will be discussed in turn.

Organisational Identification

The tendency for individuals to identify with an organisation and for this identification to influence their perceptions and behaviour is a phenomenon that has been studied by psychologists for many years.[177] [178] [179] [180] [181] [182] The roots of this phenomenon can be found in

[176] Cleto DiGiovanni, Jr. et al., 'Community Reaction to Bioterrorism: Prospective Study of Simulated Outbreak', *Emerging Infectious Diseases* 9, no. 6 (June 2003): 708–12.
[177] Michael E. Brown, 'Identification and Some Conditions of Organizational Involvement', *Administrative Science Quarterly* 14, no. 3 (September 1969): 346–55.
[178] Sang M. Lee, 'An Empirical Analysis of Organizational Identification', *Academy of Management Journal* 14, no. 2 (June 1971): 213–26.
[179] Thomas Rotondi Jr., 'Organizational Identification: Issues and Implications', *Organizational Behavior and Human Performance* 13, no. 1 (February 1975): 95–109.
[180] Fred A. Mael and Lois E. Tetrick, 'Identifying Organizational Identification', *Educational and Psychological Measurement* 52, no. 4 (December 1992): 813–24.

the social identity approach of social psychology.[183] Social Identity Theory (SIT) proposes that as well as personal identities, individuals also possess social identities based on them being a member of a group or multiple groups.[184] When applied to organisations it explains how people define themselves in terms of their membership in a specific organisation, such as their employer - a construct known as 'organisational identification'.[185] [186]

Organisational identification as a concept has been reported to be distinct to the related concepts of organisational commitment and job satisfaction.[187] [188] Ashforth and Mael reformulated the concept of organisational identification using social identity theory and defined it as the experience of perceived oneness with a group.[189] Mael and Ashfroth later discussed a feature of organisational identification as 'the experience of the organisation's successes and failures as one's own' and as such, the concept's relevance for the present topic becomes clear.[190] After an incident, the recovery of a business has the potential to be a success or a failure. If employees feel these successes and failures so personally, are they more likely to behave in a way that fosters business continuity? Mael and Ashforth examined organisational identification in alumni of a college and found that it was associated with: making financial contributions, willingness to advise others to attend and participation in functions.[191] However, the authors state that organisational identification is not necessarily the same as professional/employment identification, which is the extent to which an individual defines him/herself in terms of the work (e.g. 'I am a bus driver', rather than 'I am a TFL employee'). The research presented in this thesis focuses on organisational identification rather than professional identification because in order to increase the likelihood of recruiting sufficient numbers of participants, employees with diverse job roles were included. Further research is needed to explore the influence of professional and employment identification.

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[181] Fred Mael and Blake E. Ashforth, 'Alumni and Their Alma Mater: A Partial Test of the Reformulated Model of Organizational Identification', *Journal of Organizational Behavior* 13, no. 2 (March 1992): 103–23.
[182] Fred A. Mael and Blake E. Ashforth, 'Loyal From Day One: Biodata, Organisational Identification and Turnover among Newcomers', *Personnel Psychology* 48, no. 2 (June 1995): 309–33.
[183] Henri Tajfel and John Turner, 'An Integrative Theory of Intergroup Conflict', in *W.G. Austin & S. Worstel, The Social Psychology of Intergroup Relations*, Eds (Monterey, CA: Wadsworth, 1979).
[184] Ibid.
[185] Mael and Ashforth, 'Loyal From Day One'.
[186] Mael and Tetrick, 'Identifying Organizational Identification'.
[187] Ibid.
[188] Blake E. Ashforth and Fred Mael, 'Social Identity Theory and the Organization', *The Academy of Management Review* 14, no. 1 (January 1989): 20–39.
[189] Ibid.
[190] Mael and Ashforth, 'Alumni and Their Alma Mater', 103.
[191] Mael and Ashforth, 'Alumni and Their Alma Mater'.

Furthermore, past studies have examined the links between organisational identification and specific work related behaviours such as job satisfaction, motivation and wellbeing. [192] One study of new US Army recruits reported a link between organisational identification and military attrition and another study of physicians discovered that strength of organisational identification was positively associated with voluntary cooperation at work.[193] [194] Therefore, although past research has linked organisational identification to positive workplace behaviours, this is the first study to my knowledge to examine an association between organisational identification and the willingness of employees to report to work in the event of a serious incident, something that has been tested in the web survey of this PhD research.

Job Satisfaction

In addition to organisational identification, a further concept drawn from organisational psychology which could help inform this discussion is 'job satisfaction'. Academics have discussed a variety of precursors to an individual being satisfied with their job such as job complexity, work stressors, social and organisational support and person environment fit (the compatibility between an employee and their work environment).[195] Job satisfaction as an attitude has been linked to a range of different work related behaviours and psychological variables in the academic literature for several decades.[196] Some variables job satisfaction has been linked to in the past are: openness to change (restructuring); organisational citizenship behaviour; life satisfaction; and turnover, as well as others.[197] [198] [199] [200]

[192] Jürgen Wegge et al., 'Work Motivation, Organisational Identification, and Well-Being in Call Centre Work', *Work & Stress* 20, no. 1 (January 2006): 60–83.
[193] Mael and Ashforth, 'Loyal From Day One'.
[194] Janet M. Dukerich, Brian R. Golden, and Stephen M. Shortell, 'Beauty Is in the Eye of the Beholder: The Impact of Organizational Identification, Identity, and Image on the Cooperative Behaviors of Physicians', *Administrative Science Quarterly* 47, no. 3 (September 2002): 507–33.
[195] Nathan A. Bowling and Gregory D. Hammond, 'A Meta-Analytic Examination of the Construct Validity of the Michigan Organizational Assessment Questionnaire Job Satisfaction Subscale', *Journal of Vocational Behavior* 73, no. 1 (August 2008): 63–77.
[196] Thomas A. Wright, 'The Emergence of Job Satisfaction in Organizational Behavior', *Journal of Management History* 12, no. 3 (July 2006): 262–77.
[197] Connie R. Wanberg and Joseph T. Banas, 'Predictors and Outcomes of Openness to Changes in a Reorganizing Workplace', *Journal of Applied Psychology* 85, no. 1 (February 2000): 132–42.
[198] Dennis W. Organ and Katherine Ryan, 'A Meta-Analytic Review of Attitudinal and Dispositional Predictors of Organizational Citizenship Behavior', *Personnel Psychology* 48, no. 4 (December 1995): 775–802.
[199] Timothy A. Judge and Shinichiro Watanabe, 'Another Look at the Job Satisfaction-Life Satisfaction Relationship', *Journal of Applied Psychology* 78, no. 6 (December 1993): 939–48.

Of interest to the present study is the association between job satisfaction and absenteeism and return to work decisions after illness or injury. Although it might seem logical that those employees who are satisfied with their jobs would return to work quickly and those who are dissatisfied might not be in any rush to go back, the past research examining this association has revealed mixed results. A study by Froom et al. found that low job satisfaction strongly predicted a delay in employees returning to work after gallbladder removal surgery.[201] Similarly, low levels of job satisfaction have been found to be a risk factor for the length of sickness absence caused by low back pain in a study by Hoogendoom et al.[202] However, it should be noted that the study did not take into account the absence policies of different companies or the different company cultures related to sickness absence, which also could have played a role.

By contrast, other researchers have not found any evidence of a relationship between job satisfaction and returning to work after illness or injury. For example, Krause et al. found that job satisfaction had no association with the time it took employees to return to work after compensated disabling low back pain.[203] Scott and Taylor conducted a meta-analysis on the relationship between job satisfaction and absenteeism and concluded that differences in the method and analysis used in past studies, such as the use of different measures and sampling errors, could explain the inconsistencies in the findings.[204] Although research has failed to prove the existence of consistent relationship between job satisfaction and returning to work after illness or injury, there is still the potential for job satisfaction to be linked to willingness to report to work during a serious incident. A possible explanation for why the two relationships might be different is that returning to work after recovering from illness or injury is something that employees would perceive as being expected of them, and thus job satisfaction may not strongly influence this decision. However, during a serious incident such as a CBRN terrorist attack, returning to work is something that employees may not consider would be expected of

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[200] Robert P. Tett and John P. Meyer, 'Job Satisfaction, Organizational Commitment, Turnover Intention, and Turnover: Path Analyses Based on Meta-Analytic Findings', *Personnel Psychology* 46, no. 2 (June 1993): 259–93.

[201] Paul Froom et al., 'Low Job Satisfaction Predicts Delayed Return to Work After Laparoscopic Cholecystectomy', *Journal of Occupational* 43, no. 7 (July 2001): 657–62.

[202] W. E. Hoogendoorn et al., 'High Physical Work Load and Low Job Satisfaction Increase the Risk of Sickness Absence due to Low Back Pain: Results of a Prospective Cohort Study', *Occupational and Environmental Medicine* 59, no. 5 (May 2002): 323–28.

[203] Niklas Krause et al., 'Psychosocial Job Factors and Return-to-Work after Compensated Low Back Injury: A Disability Phase-Specific Analysis', *American Journal of Industrial Medicine* 40, no. 4 (October 2001): 374–92.

[204] K. Dow Scott and G. Stephen Taylor, 'An Examination of Conflicting Findings on the Relationship Between Job Satisfaction and Absenteeism: A Meta-Analysis', *Academy of Management Journal* 28, no. 3 (September 1985): 599–612.

them due to a perception that they might be putting their health at risk by coming into the office, and, as such, job satisfaction could potentially influence this perceived 'voluntary' behaviour.

In a similar way, research has found job satisfaction to be a stronger predictor of organisational citizenship behaviour (individual contributions in the workplace that go beyond what is required by an individual's role or by what is contractually rewarded) than it is of 'in-role performance'.[205] When one considers the voluntary aspect of willingness to work during an extreme event, the potential for it to be associated with job satisfaction becomes clear. The research presented in this thesis is, to my knowledge, the first of its kind to apply the concept of job satisfaction to the willingness of employees to report to work during a serious incident and, as such, a measure of job satisfaction is included as a predictor variable in the employee web survey reported in Chapter 4.

Summary

There is a lack of understanding of the role that various individual psychosocial factors and organisational responses play in determining the short and long-term effects of high-impact, low-probability events such as CBRN terrorist attacks on business continuity and organisational resilience. Past academic research and evidence from real incidents has found that the public response to CBRN events has the potential to significantly impact upon response and recovery.[206] [207] [208] However, many of the trends to come out of the research with the public have never been tested in an organisational setting. This gap in the research needs to be addressed as the staff response to a CBRN event has the potential to severely impair an organisation's ability to recover and return to normal functioning. Specifically, it is likely that employee levels of knowledge, concerns, perceptions of risk and the resulting behavioural changes associated with CBRN incidents may influence whether or not they report to work. There are also other potential psychological influences that may affect their decision, such as their perceptions of their personal and professional obligations, which will need to be addressed. Past academic research with healthcare workers suggests that not all staff who are

[205] Organ and Ryan, 'A Meta-Analytic Review of Attitudinal and Dispositional Predictors of Organizational Citizenship Behavior'.
[206] Pearce et al., 'Communicating with the Public Following Radiological Terrorism'.
[207] Becker, 'Emergency Communication and Information Issues'.
[208] IAEA (International Atomic Energy Agency), 'The Radiological Accident in Goiania'.

able to report to work during a CBRN incident will necessarily be willing to do so.[209] Consequently, if the employees of national infrastructure organisations do not report to work in the event of a serious incident such as a CBRN attack and do not return in the days, weeks or months following the incident, this would severely impact the response and recovery of the whole country.

In light of this potential problem, the research presented in this thesis will focus on understanding employers' (business continuity decision-makers) and employees' assumptions, knowledge and behavioural intentions following extreme events such as CBRN incidents. It will also investigate the practical and communication interventions used by organisations and how these may impact on individual responses to these events. A variety of psychological theories will be used to examine these issues in more detail. A number of these theories have not previously been applied to this topic.

Research Aims

Overarching research aims

Using a mixed-methods approach, this PhD research has been designed to identify the assumptions that business continuity managers and business continuity plans make about employees' likely behaviour during and in the aftermath of a serious incident, including those involving CBRN hazards. It will also identify examples of good practice within the participating organisations. The research will focus on factors affecting employees' likely ability and willingness to continue to work during/after an incident, with the main focus being on their willingness to work. The research will also examine the barriers and facilitators (both physical and psychological) that could influence employees' decisions about whether or not to report to work, along with their information needs and expectations of their employers' response during the incident. Finally, this research will investigate what factors predict an individual's willingness to report to work during a hypothetical extreme event.

[209] Gershon et al., 'Factors Associated with the Ability and Willingness of Essential Workers'.

Research aims by data collection method

Study 1: Semi-structured interviews with business continuity and resilience professionals with a current or former role at a national infrastructure organisation (Chapter 3)

The aims of the study were to ascertain:

1. What business continuity managers and resilience professionals believe are the best ways to plan for disruption.
2. How business continuity managers and resilience professionals perceive the likely behaviour of employees during extreme events, particularly CBRN incidents.
3. How business continuity managers and resilience professionals plan to address the barriers and facilitators to employees' willingness and ability to work in the event of a serious incident.
4. What assumptions business continuity managers and resilience professionals are making based on their experience of past incidents or individual beliefs.

Study 2: Web survey with employees from any industry or sector (Chapter 4)

The aims of the study were to ascertain:

1. What factors (demographic, psychological and job-related) might influence employees' willingness to go to work in the event of a serious incident.
2. If the perceived willingness and ability of employees to go to work varies by incident type.
3. What barriers and motivating factors play a role in the decisions of employees to return to work in the event of a serious incident.

Study 3: Scenario-based employee focus groups within national infrastructure organisations (Chapter 5)

The aims of the study were to ascertain:

1. If employees will go to work in the event of a pneumonic plague outbreak.
2. How the level of information employees are given about a pneumonic plague outbreak influences their general thoughts and feelings about the event.

3. What barriers might employees face when deciding whether or not to return to work in the event of a pneumonic plague outbreak.
4. What factors might motivate employees to return to work in the event of pneumonic plague outbreak.
5. What information employees will want to know in the event of a pneumonic plague outbreak.
6. What the preferred information sources are for employees during a pneumonic plague outbreak.
7. What makes employees believe an organisation when they tell them it is safe to go back to work in the event of a pneumonic plague outbreak.
8. If staff reactions to a pneumonic plague outbreak vary by sector.

Outline of the Thesis

Chapter 2 presents the findings of a systematic literature review of peer-reviewed research examining the behavioural intentions of employees during *hypothetical* incidents; specifically their willingness to work and also findings related to their ability to work and potential barriers and motivating factors (facilitators). The majority of the 65 research articles that met the inclusion criteria were survey studies assessing the willingness and ability of healthcare workers to report to work during hypothetical serious incidents, and in half of the studies the incident of choice was an influenza outbreak or pandemic. This systematic literature review revealed that a range of factors could potentially influence an employee's decision about whether or not to work during an extreme event. Several gaps in the research literature were identified, including: (i) the need to apply the concept of willingness to work to sectors of national infrastructure other than health; (ii) the need to apply academic theory to the concept; and (iii) the need to compare the likely behaviour of staff of national infrastructure organisations to the assumptions of the decision-makers, the business continuity managers. The outcomes of the literature review presented in Chapter 2 were used to inform the development of the studies presented in the subsequent chapters.

Chapter 3 reveals the findings of a series of semi-structured interviews with business continuity, crisis management or resilience decision-makers from national infrastructure organisations. An analysis of 21 interview transcripts revealed that business continuity

planning within the UK national infrastructure is based on many behavioural assumptions and grounded in little or no academic research regarding the likely reactions of employees during a high-impact, low-probability event. Very few organisations involved in the research had actually asked staff about their likely concerns or issues they may face in the event of an incident that causes significant disruption. Furthermore, many assumptions surrounding likely staff behaviour seemed to be based on conventional wisdom and experiences of staff reporting to work during incidents that were not CBRN. There were also potentially dangerous assumptions made by some interviewees that their staff would return to work in any situation, something that could put businesses at serious risk in a time when they need to be working on recovery. The study revealed the importance of finding out about the likely behaviour of staff during serious incidents as well as any expectations they might have of their employers' response.

Chapter 4 presents the findings from a web survey examining the factors that predict the willingness of employees to report to work in the event of a range of hypothetical serious incidents, including some involving a CBRN hazard. The results revealed that not all staff may be willing to report to work during a serious incident, with willingness rates being particularly low for incidents with a CBRN element. It also revealed a range of different factors that predicted the willingness of employees to report to work during a serious incident and provided support for a modified version of the Extended Parallel Process Model (EPPM). Overall, the survey study has shown that organisations should plan for significant rates of absenteeism during serious incidents because of employees not being willing to go to work rather than simply not being able.

The analysis of a series of scenario-based employee focus groups is presented in Chapter 5. These groups were made up of employees without any business continuity responsibilities and took place within national infrastructure organisations in the following sectors: energy, financial services, Government and health. The hypothetical scenario used in the focus groups was a deliberate release of pneumonic plague at a mainline train station in central London. The results of the study revealed that employees are likely to be concerned about the risk to their health by going to work in the event of an infectious disease outbreak, particularly one that has the potential to be fatal, and that this concern could result in them refusing to report to work. The study also found that in the event of an extreme event employees would expect a great deal from their employer in terms of communication and practical interventions.

The final chapter (Chapter 6) presents an overview of the thesis, including the unique contributions the findings of this research have provided to the understanding of likely employee responses to extreme events. The empirical findings from all the studies have been synthesised in order to form the overall research conclusions. These conclusions take the form of a series of practical recommendations for organisations. These recommendations have been informed by the findings of the primary data collection (Chapters 3-5), the systematic review of previous peer-reviewed literature (Chapter 2) and grounded in the relevant academic theories presented in Chapter 1. Each recommendation is discussed alongside links to the supporting evidence and theoretical frameworks. The chapter concludes with a discussion of the strengths and limitations of the research presented in this thesis and a number of suggestions for future research studies.

Research Ethics

Throughout the research process there were a number of ethical issues that needed consideration. The data collection activities were approved by the KCL War Studies Group Research Ethics Panel (REP(WSG)/11/12-28) and the relevant data storage policies adhered to.

Due to the sensitive nature of some of the topics in this research it was important to design and conduct the study in a way that reduced the likelihood participants would experience any distress or anxiety. The author first spoke to the PhD supervisors who have conducted a great deal of research of this type with members of the public, to see if they had encountered any ethical issues that were above and beyond the usual issues that arise. The author also contacted an academic at the KCL Institute of Psychiatry familiar with this type of work for advice. The risk of causing distress was deemed low due to the fact that even for people who have directly witnessed traumatic events, little negative impact has been caused by participating in research that asks about those events. For example, one study of 5,774 members of the public in the US found that less than 1% were emotionally upset after taking part in a survey regarding their experiences of the September 11th terrorist attacks.[210]

The interviews were conducted with people who deal with these issues on a daily basis and so were less likely than members of the public to experience distress discussing them. The interview participants were asked about their previous experience of incidents, but not pushed

[210] Sandro Galea et al., 'Participant Reactions to Survey Research in the General Population after Terrorist Attacks', *Journal of Traumatic Stress* 18, no. 5 (1 October 2005): 461–65.

for answers. Participants in the focus groups were discussing a hypothetical incident and were not asked about any past experiences. In both the interviews and the focus groups, if it appeared the participants were uncomfortable discussing any particular topic then the researcher moved on to another topic. In the focus groups, although every participant was given the chance to speak, no individual participants were pressed for a response if it appeared they did not wish to answer. At the beginning of the focus groups the moderator reassured participants that although the incident they would be discussing was very serious in nature, it was hypothetical and extremely unlikely to happen. They were also reassured that although the moderator was from a Government department, the moderator had no information that this scenario was of particular interest to the Government or any more likely to happen than any other serious incident. Alongside the more serious scenarios used in the survey, such as the CBRN terrorist incidents, the list of potential scenarios also included less fear-inducing incidents such as snow and flooding. As per the KCL ethical procedure, the contact details of both the researcher and the supervisor were provided to all participants to use if they felt the study had harmed them in any way or if they wanted more information. It should be noted that no participants reported any concerns, withdrew due to distress or experienced any visible signs of anxiety during the research.

As with all research with human participants, gaining informed consent was a required component of the data collection process. Participants of the interview and focus group studies were asked to sign a consent form which stated that they voluntarily agreed to take part in the study, after having been provided all the information about what was involved. This information was provided to participants via an information sheets in the interview and focus group studies. All participants were told at the beginning of the studies that they did not have to take part if they did not want to and that they did not have to sign the consent form after reading the information sheet. After signing the consent form participants were reminded they could leave the room at any time and their data would be removed from the study. Due to the nature of the study and the location of the data collection it was also important to inform the volunteers that participation would not affect their employment in any way and that their employers would not be shown their responses. For the survey study, informed consent was gained via the first screen of the web survey which asked participants to select an option which stated that they agreed to take part in the study, after reading a series of ethical statements. Participants were free to end the survey at any time and their data were not included in the analysis.

Due to the fact that focus group participants were recruited through gatekeepers, it was

important that participants did not feel they were obligated to take part and that they were not coerced into volunteering. All gatekeepers were briefed on the importance of this and were required to send out an email that had been pre-approved by the ethics committee. No line managers were present in the focus groups and as mentioned above participants were reminded they were free to leave at any time without it affecting their employment.

It was also important that the research process maintained confidentiality and anonymity. Interview and focus group participants were made aware that although their participation was audio-recorded, once transcribed the original recording would be destroyed and any quotes would not be associated with them individually. All participants were referred to by a number and all company details and identifiable information removed. Any quotes used in the write up were attributed to an anonymous employee of a general sector (e.g. energy sector). Survey participants were informed on the first page of the survey that their contribution would be anonymous.

Chapter 2: Systematic Literature Review

Introduction

Business Continuity Management (BCM) is concerned with planning for the disruption that incidents could potentially cause to business operations, with the aim of returning to normal functioning as quickly as possible.[211] However, assumptions are made by planners about the ways in which individual employees responsible for operating the key business systems and processes will respond during extreme events. Assumptions about staff responses to extreme events can be challenged or reinforced by examples of real incidents. After the Three Mile Island (TMI) nuclear disaster in 1979, it was reported that a large number of residents evacuated the area.[212] Manufacturing firms in the area lost an estimated $7.67 million in the value of production as a result of this evacuation, caused in part by loss of staff.[213] This example demonstrates the impact that staff absenteeism could have on the business operations of national infrastructure organisations.

As well as causing serious consequences for the individual organisations, the failure of staff to perform their duties could also have significant impacts for the UK as a whole. For example, if the staff of a power plant did not report to work, essential services such as hospitals might experience a loss of power. Furthermore, if supermarket workers did not report to work, the country could begin to experience problems with food supply. In light of this, it is important for organisations to consider employees' willingness and ability to go to work during extreme events in their business continuity planning. An organisation can only recover from disruption if its staff are working; therefore an important component of an organisation's resilience is the willingness and ability of staff to return to work. The concepts of being *able* to go to work and perform one's duties and being *willing* to do so are potentially two very different things, and

[211] United Kingdom. HM Government, 'How Prepared Are You? Business Continuity Management Toolkit Version 1'.
[212] United States. President's Commission on the Accident at Three Mile Island, 'The Need for Change: The Legacy of TMI: Report of the President's Commission on the Accident at Three Mile Island.'
[213] Houts, Cleary, and Hu, *The Three Mile Island Crisis: Psychological, Social, and Economic Impacts on the Surrounding Population*, 40.

were explored in detail in Chapter 1. The focus of this research is on staff willingness and intention to report to work; however factors related to ability are also included due to the potential relationship between the two concepts.

Research has shown that there could be both internal and external influences on an employee's decision whether or not to report to work in a serious incident. However, data is limited on the specific reasons for absenteeism in real incidents and only a small number of academic studies have examined this issue. Recognition of the combined internal and external influences on an employee's decision to report to work during an extreme event can be found across a number of countries. For example, Koh et al. noted that during the SARS outbreak in Singapore in 2003, healthcare workers experienced a great deal of anxiety, work stress and social stigmatism but often felt that a risk of falling ill with SARS was part of their job.[214] Furthermore, a study by Tzeng found that a significant predictor of Taiwanese nurses fulfilling their professional care obligation in a SARS outbreak was their level of agreement with SARS infection control measures.[215]

Similarly, in the US, first responders who assisted with the response on 9/11 reported difficulty finding a balance between protecting their own personal safety and honouring the duty of care they had for the victims.[216] Finally, Davidson et al. examined employees' decisions about reporting to work during the San Diego wild fires of 2003.[217] The researchers reported a 10.6% no show rate at the hospital on the first day of the fire. This decision was driven by employees' first inclination to assess their physical safety and wellbeing and that of their family and then their pets. Participants discussed feeling torn between wanting to care for their significant others and going to work to support their colleagues. A desire to help those affected by the fires followed once personal, family and pet safety were established. A focus group study examining nurses' needs and concerns following Hurricane Floyd in Florida noted that local news reported that a number of employees failed to show up to work for hurricane duty (as per hospital policy) and subsequently had their employment terminated for 'job

[214] Koh et al., 'Risk Perception and Impact of Severe Acute Respiratory Syndrome (SARS) on Work and Personal Lives of Healthcare Workers in Singapore'.
[215] Huey-Ming Tzeng, 'Nurses' Professional Care Obligation and Their Attitudes Towards SARS Infection Control Measures in Taiwan During and After the 2003 Epidemic', *Nursing Ethics* 11, no. 3 (May 2004): 277–89.
[216] Erin Smith, 'Willingness to Work during a Terrorist Attack: A Case-Study of First Responders during the 9/11 World Trade Centre Terrorist Attacks', *Journal of Emergency Primary Health Care* 6, no. 1 (2008): 1–11.
[217] Davidson et al., 'Disaster Dilemma'.

abandonment'.[218] It should be noted here that the authors did not provide a citation for the news reports, so these cannot be verified. Nonetheless, this example and the previous examples provide evidence from real world events of staff absenteeism and of the potential influences that could affect employees' decisions about reporting to work.

Due to the limited past research on real incidents, particularly those involving a CBRN hazard, a systematic literature review was conducted. The aim of the review was to collate and summarise the literature examining the behavioural intentions of employees during *hypothetical* incidents. More specifically, it aimed to review studies examining the willingness and ability of staff to report to work and the potential barriers and motivating factors (facilitators) influencing their decisions. Although some examples of staff absenteeism resulting from real incidents have been reported previously, the peer-reviewed academic research examining absenteeism rates after real incidents is limited. Few organisations have released information on their absenteeism rates, and when they have, the specific reasons for the individuals being absent (i.e. whether they are unwilling or unable to work) are not often evident. Therefore, it was decided to only include hypothetical incident studies in the review in order to examine the potential reasons for staff being absent in more detail. In addition, the hypothetical incident studies are more likely to include high-impact, low-likelihood incidents such as CBRN terrorist attacks, for which there have not been many real examples.

Systematic literature reviews are a useful and relatively unbiased method for integrating large amounts of existing information on a chosen topic, summarising the evidence and subsequently using this to draw conclusions or make recommendations.[219] [220] The outcomes of this review informed the data collection activities presented in Chapters 3-5 of this thesis, including the predictor variables selected for use in the web survey (Chapter 4). Studies included in the literature review have also been used to provide supporting evidence for the recommendations presented in Chapter 6.

[218] Emily D. French, Mary Lou Sole, and Jacqueline Fowler Byers, 'A Comparison of Nurses' Needs/Concerns and Hospital Disaster Plans Following Florida's Hurricane Floyd', *Journal of Emergency Nursing* 28, no. 2 (April 2002): 111–17.
[219] Cynthia D. Mulrow, 'Systematic Reviews: Rationale for Systematic Reviews', *BMJ* 309, no. 6954 (September 1994): 597–99.
[220] Adrian White and Katja Schmidt, 'Systematic Literature Reviews', *Complementary Therapies in Medicine* 13, no. 1 (March 2005): 54–60.

Method

Inclusion criteria

The methodology for integrative review was similar to the method used by Chaffee:[221]

1. Research design: Both quantitative and qualitative designs were included.
2. Study sample: Employees of any organisation in any sector.
3. Outcome measure: Willingness to work, or intention to report to work, in a disaster, extreme event or public health emergency. Studies examining potential absenteeism or workplace abandonment were also included if considered relevant to willingness to work. Only hypothetical incidents were included.
4. Research methodologies: Reports of published quantitative and qualitative studies were included in this review.
5. Language of studies: English only.
6. Time period: From inception to August 2012
7. Dates of review: January to August 2012.
8. Type of research report: Peer-reviewed research articles and peer-reviewed research abstracts. Unpublished reports (e.g. government reports, conference proceedings and dissertations) were not included.

Search strategy

A method as described by Chaffee was adapted for the search strategy:[222]

1. Electronic database searching: ISI Web of Knowledge; PsycINFO; Medline; and Embase were all searched for relevant studies. Search terms were: “willingness”, “work”, “willingness disaster”, “willingness to report”, “reporting to work”, “willingness research”, “absenteeism”, “employee responses”, “staff behaviour”, “public health emergencies”. Terms were combined with “willingness”, “pandemic”, “disaster”, “terrorism” and “CBRN”.
2. Ancestry searching: The reference list of each publication was examined for other relevant studies.

[221] Chaffee, ‘Willingness of Health Care Personnel to Work in a Disaster’.
[222] Ibid.

3. Internet searching: An internet search engine (Google/Google Scholar) was used to ensure no further articles had been missed in the electronic database search. The same search terms were used.
4. Networking: Individuals with a known interest in the topic were contacted to ask if they were aware of any other relevant studies.

Screening process

Article titles were reviewed for potential relevance, followed by the abstracts. Full articles were then obtained for those studies meeting the inclusion criteria. If the full version of the article could not be obtained after requesting a copy from the King's College London and Public Health England libraries and after emailing the authors, it was only included if useful and relevant information could be ascertained from the abstract.

Results

The systematic literature review revealed two previous literature reviews on the topic of the willingness of healthcare workers to work during hypothetical serious incidents. The first review by Smith in 2007 reviewed studies examining the willingness of emergency healthcare workers to work during major emergencies and disasters and a second review by Chaffee published in 2009 focused on the willingness of healthcare personnel to work in a disaster.[223] [224] The existence of two previous systematic literature reviews was not deemed to negate the need for the present review due to the previous reviews solely focusing on healthcare workers. Furthermore, additional studies were known to exist that were not included in the previous reviews. Smith's review only examined 8 relevant studies and Chaffee identified 27 studies (including two that were not peer-reviewed) that met the inclusion criteria. For the present review, 65 peer-reviewed research articles met the inclusion criteria and were included in the final review, from approximately 1500 titles and abstracts that were examined. Out of these 65, there were three studies for which the authors had published two separate

[223] Erin Smith, 'Emergency Health Care Workers' Willingness to Work during Major Emergencies and Disasters', *The Australian Journal of Emergency Management* 22, no. 2 (May 2007): 21–24.
[224] Chaffee, 'Willingness of Health Care Personnel to Work in a Disaster'.

papers on the results. These papers were included in the review as the results presented in each paper were different.

Data collection method

61 studies out of the 65 included in the final review used a survey as the primary data collection method, three included interviews and/or focus groups and one study used both focus groups and a survey. The key concept of 'willingness' to work was measured in a variety of ways, with the most frequent being to ask respondents if they would be willing to report to work or remain at work for one or more hypothetical scenarios. In some cases, the studies differentiated between being willing to report to work 'if required' and being willing to report to work 'if asked but not required'.[225] [226] [227] [228] There were also several other variations on willingness to work. For example, respondents were asked if they would be willing to work in these circumstances: when the job required face-to-face contact with a potential infectious patient; when transmission to their family was possible; and if they had not had a vaccine.[229] [230] [231] A table of the key willingness findings from each study included in the final review is presented in Appendix A.

Study samples

The sample sizes ranged from the smallest samples of 58 for a qualitative study and 64 for a quantitative study to the largest sample of 6428 for a quantitative study.[232] [233] [234] The vast

[225] Balicer et al., 'Characterizing Hospital Workers' Willingness to Report to Duty in an Influenza Pandemic'.
[226] Ran D. Balicer et al., 'Characterizing Hospital Workers' Willingness to Respond to a Radiological Event', *PLoS ONE* 6, no. 10 (October 2011).
[227] Barnett et al., 'Assessment of Local Public Health Workers' Willingness to Respond to Pandemic Influenza'.
[228] Barnett et al., 'Gauging U.S. Emergency Medical Services Workers' Willingness to Respond to Pandemic Influenza'.
[229] Nicole E. Basta, Sharlene E. Edwards, and Joann Schulte, 'Assessing Public Health Department Employees' Willingness to Report to Work During an Influenza Pandemic', *Journal of Public Health Management and Practice* 15, no. 5 (October 2009): 375–83.
[230] Young and Persell, 'Biological, Chemical, and Nuclear Terrorism Readiness'.
[231] Patricia A. Lenaghan, Philip W. Smith, and Deepali Gangahar, 'Emergency Preparedness and Bioterrorism: A Survey of the Nebraska Medical Center Staff and Physicians', *Journal of Emergency Nursing* 32, no. 5 (October 2006): 394–97.
[232] Smith et al., 'Paramedics' Perceptions of Risk and Willingness to Work during Disasters'.
[233] Julie Considine and Belinda Mitchell, 'Chemical, Biological and Radiological Incidents: Preparedness and Perceptions of Emergency Nurses', *Disasters* 33, no. 3 (July 2009): 482–97.

majority of studies (62 out of 65) had a sample made up of employees working in the health sector. Only three studies contained participant groups who did not work in the health sector: DiGiovanni et al., in addition to medical first responders, also studied their spouses/partners, a group of journalists and a group of community residents; Gershon et al., in addition to healthcare workers, also included police department personnel, fire department personnel and correctional facility officers; and Smith and Walton's study used staff in a local government organisation.[235] [236] [237]

Content of studies

Half of all the studies included in the review examined the willingness of employees to report to work during an influenza/pandemic event. Table 2.1 presents the hypothetical scenarios used in the 65 studies included in the final review.

Table 2.1 Breakdown of literature review studies by hypothetical scenario

Hypothetical scenario	No. of studies
Influenza/pandemic	32
Multiple incidents	13
Bioterrorism	9
Radiological incident	2
Disaster (manmade/natural)	2
SARS	2
Serious infectious disease	1
Infectious disease outbreak/public health emergency	1
Smallpox	1
Unconventional missile attack	1
Earthquake	1
Total	**65**

A complete table containing the methodological details and the key willingness to work findings of all 65 peer-reviewed studies can be found in Appendix A.

Use of a theoretical framework

In total, seven studies described the use of an established theoretical framework. Firstly, Balicer et al. applied the Extended Parallel Process Model (EPPM) to the topic of the

[234] Qureshi et al., 'Health Care Workers' Ability'.
[235] DiGiovanni, Jr. et al., 'Community Reaction to Bioterrorism'.
[236] Gershon et al., 'Factors Associated with the Ability and Willingness of Essential Workers'.
[237] Smith and Walton, 'Returning to Work after the Big One'.

willingness of hospital employees to report to work during an influenza pandemic or a radiological terrorist incident.[238] [239] Two further studies also applied the EPPM to healthcare workers' willingness to report to work.[240] [241] A second theory to be used by Kim et al. and Ko et al. in their studies of nurses' intentions to care for SARS patients was the Theory of Planned Behaviour.[242] [243] Finally, Smith and Walton applied Social Network Analysis to their study of the return to work decisions of staff of a local government organisation in the event of an earthquake.[244]

Davidson et al. discussed the tension employees felt as a result of their obligations to family, community and organisation but did not apply a theoretical framework such as role conflict theory to their findings.[245] [246] They also discussed the perceived importance of the employees' roles but failed to apply theories such as Protection Motivation Theory or EPPM to these findings (see Chapter 1 for more information about these theories).[247] [248]

Therefore, the majority of studies included in this literature review did not apply a theoretical framework to their research, although others made use of the conceptual frameworks developed in previous willingness to work research. Chaffee reported a similar finding in her review and also noted that using theory to guide research is part of the scientific process.[249] In light of this finding, there is a need for more research to be conducted which applies established theoretical frameworks to the topic of the willingness of employees to report to work during extreme events.

[238] Balicer et al., 'Characterizing Hospital Workers' Willingness to Report to Duty in an Influenza Pandemic'.
[239] Balicer et al., 'Characterizing Hospital Workers' Willingness to Respond to a Radiological Event'.
[240] Barnett et al., 'Assessment of Local Public Health Workers' Willingness to Respond to Pandemic Influenza'.
[241] Barnett et al., 'Gauging U.S. Emergency Medical Services Workers' Willingness to Respond to Pandemic Influenza'.
[242] Cho-Ja Kim et al., 'Attitude, Beliefs, and Intentions to Care for SARS Patients among Korean Clinical Nurses: An Application of Theory of Planned Behavior', *Journal of Korean Academy of Nursing* 36, no. 4 (June 2006): 596–603.
[243] Nai-Ying Ko et al., 'Applying Theory of Planned Behavior to Predict Nurses' Intention and Volunteering to Care for SARS Patients in Southern Taiwan', *The Kaohsiung Journal of Medical Sciences* 20, no. 8 (August 2004): 389–98.
[244] Smith and Walton, 'Returning to Work after the Big One'.
[245] Davidson et al., 'Disaster Dilemma'.
[246] Killian, 'The Significance of Multiple-Group Membership in Disaster'.
[247] Rogers, 'A Protection Motivation Theory'.
[248] Witte, 'Putting the Fear Back into Fear Appeals'.
[249] Chaffee, 'Willingness of Health Care Personnel to Work in a Disaster'.

Key findings of literature review: willingness to work

The willingness of employees to report to work during a serious incident varied greatly across all the studies and was dependent on the specific scenario details the participants were given. The willingness rates ranged from 98% of emergency department personnel reporting they would be being willing to work additional hours for victims of an airplane crash, to just 4% of paramedics who said they 'probably' would remain on duty, and none 'definitely' would remain on duty to treat/care for patients with smallpox if they did not have any protective gear and a vaccine was not available.[250] [251]

In general, the research on willingness to report to work has shown that not everyone who is 'able' to work, would necessarily be 'willing', and the ability and willingness rates found in the reviewed studies often differed. For example, Gershon et al.'s study revealed that although 80% of essential workers would be *able* to work during a serious pandemic event, only 65% would be *willing* to do so.[252] In contrast, Katz et al. reported that although 73.8% of dentists in their sample were *willing* to provide assistance to the state of Hawaii's bioterrorism response, only 9.2% indicated they were *able* to respond effectively to a bioterrorism attack.[253]

The review of the literature revealed a number of factors that could potentially affect an individual's willingness to report to work in the event of a serious incident. Table 2.2 presents a list of these key factors, which are discussed below in relation to the relevant literature.

[250] Lori Masterson et al., 'Willingness to Respond: Of Emergency Department Personnel and Their Predicted Participation in Mass Casualty Terrorist Events', *The Journal of Emergency Medicine* 36, no. 1 (January 2009): 43–49.
[251] Niklas Mackler, William Wilkerson, and Sandro Cinti, 'Will First-Responders Show Up for Work During a Pandemic? Lessons From a Smallpox Vaccination Survey of Paramedics', *Disaster Management & Response* 5, no. 2 (April 2007): 45–48.
[252] Gershon et al., 'Factors Associated with the Ability and Willingness of Essential Workers'.
[253] Alan R. Katz et al., 'Dentists' Preparedness for Responding to Bioterrorism: A Survey of Hawaii Dentists', *Journal of the American Dental Association* 137, no. 4 (April 2006): 461–67.

Table 2.2 Factors influencing willingness to work revealed in systematic literature review

Key Factors
Demographic factors
Incident type
Fear/concern for self
Fear/concern for others
Personal obligations
Job role
Perception of importance of role/self-efficacy
Professional obligations and duty of care
Employer provisions
Perceptions of employer
Ability to get to work and perform duties
Knowledge and information
Training

Demographic factors:

A number of studies reported a gender difference in willingness to work, most frequently finding that females were less likely than males to report to work or risk their life for a patient in the event of a serious incident.[254] [255] [256] [257] [258] [259] For example, a survey study of healthcare workers in Georgia found that females were more likely to report being unwilling to report to work than males in the event of an avian flu pandemic (25.6% of females to 8.7% of males).[260] However, it should be noted that there were only 46 male healthcare workers included in the sample, compared to 242 females. A similar finding was reported by Damery et al., who found that female healthcare workers in the UK were significantly less likely to report being willing to work during an influenza pandemic than males; however again the sample comprised more female respondents than male (704 females to 323 males).[261]

[254] Yaron Bar-Dayan et al., 'Who Is Willing to Risk His Life for a Patient with a Potentially Fatal, Communicable Disease during the Peak of A/H1N1 Pandemic in Israel?', *Journal of Emergencies, Trauma and Shock* 4, no. 2 (April 2011): 184–87.
[255] Sarah Damery et al., 'Will the NHS Continue to Function in an Influenza Pandemic? A Survey of Healthcare Workers in the West Midlands, UK', *BMC Public Health* 9, no. 1 (May 2009): 142.
[256] Catherine J. Goodhue et al., 'Willingness to Respond in a Disaster: A Pediatric Nurse Practitioner National Survey', *Journal of Pediatric Health Care* 26, no. 4 (July 2012): e7–20.
[257] Masterson et al., 'Willingness to Respond'.
[258] Qureshi et al., 'Health Care Workers' Ability'.
[259] Y. Shapira et al., 'Willingness of Staff to Report to Their Hospital Duties Following an Unconventional Missile Attack: A State-Wide Survey', *Israel Journal of Medical Sciences* 27, no. 11–12 (December 1991): 704–11.
[260] Maia Butsashvili et al., 'Knowledge and Anticipated Behavior of Health Care Workers in Response to an Outbreak of Pandemic Influenza in Georgia', *Journal of Infection in Developing Countries* 1, no. 3 (November 2007): 329–32.
[261] Damery et al., 'Will the NHS Continue to Function'.

Another demographic factor found to have an association with willingness to work was the age of the employee; however this review revealed mixed findings concerning this variable. Bar-Dayan et al. found that younger employees (those between 18 and 24) were significantly less likely to report being willing to risk their life for a patient during an A/H1N1 pandemic than employees in the older age groups.[262] Similarly, Basta et al. found that public health department employees aged 35 or older, compared with those under 24, were significantly more likely to report a willingness to respond to an influenza pandemic, and a study by Ogedegbe et al. reported that being in an older age group was a significant predictor of willingness to work in a disaster.[263] [264] In contrast, Mackler, Wilkinson and Cinti reported that being a younger paramedic was associated with a greater likelihood of remaining on duty during a smallpox event; however, it should be noted that the study had a small sample of 95.[265] Not all studies examining the association between age and willingness reported a significant finding. For example, Burke et al. concluded that the age of paediatric healthcare employees had no association with willingness to report to a disaster and Considine and Mitchell found no significant correlations between nurses' willingness to participate in CBR incidents and age.[266] [267]

Lastly, a small numbers of studies have found an association with willingness to work and education. Bar-Dayan et al. reported that healthcare workers' willingness to risk one's life for a patient was significantly lower in those with a non-academic education.[268] Considine and Mitchell found a positive association having a postgraduate qualification in emergency nursing and willingness to work during a CBR incident, but it should be noted that the study had a small sample of just 64 emergency department nurses.[269] However, in Burke et al.'s study of paediatric healthcare employees, education had no association with willingness to work in a disaster.[270]

[262] Bar-Dayan et al., 'Who Is Willing to Risk His Life'.
[263] Basta, Edwards, and Schulte, 'Assessing Public Health Department Employees' Willingness'.
[264] Chinwe Ogedegbe et al., 'Health Care Workers and Disaster Preparedness: Barriers to and Facilitators of Willingness to Respond', *International Journal of Emergency Medicine* 5 (June 2012): 29.
[265] Mackler, Wilkerson, and Cinti, 'Will First-Responders Show Up for Work During a Pandemic?'.
[266] Rita V. Burke et al., 'Factors Associated with Willingness to Respond to a Disaster: A Study of Healthcare Workers in a Tertiary Setting', *Prehospital and Disaster Medicine* 26, no. 4 (October 2011): 244–50.
[267] Considine and Mitchell, 'Chemical, Biological and Radiological Incidents'.
[268] Bar-Dayan et al., 'Who Is Willing to Risk His Life'.
[269] Considine and Mitchell, 'Chemical, Biological and Radiological Incidents'.
[270] Burke et al., 'Factors Associated with Willingness to Respond to a Disaster'.

Incident type:

Adams and Berry found that healthcare personnel in the US were most willing to report to work in the event of an explosion (93.0%) or a winter weather event (92.8%) and least willing to report to work during a SARS outbreak (74.6%) or a radiological event (69.1%).[271] Similarly, Qureshi et al. reported that healthcare workers in the US were most willing to report to work for a mass casualty incident (86%), an environmental disaster (84%) or a snow storm (80%) and least likely to report to work for a chemical event (68%), a smallpox epidemic (61%), a radiological event (57%) or an outbreak of SARS (47%).[272] In a study by Hope et al., 78% of front line health staff in Australia reported being willing to work in a weather related event compared to 67% in an influenza pandemic and 52% in a bioterrorism event.[273] Willingness rates also varied by incident in a study by DiMaggio et al., with US emergency medical technicians reporting high levels of willingness to report to work in the event of explosions (87.7%), a landfill fire (87/1%) or a snowstorm (84.1%), and slightly lower numbers willing to work in the event of a chemical attack (74.3%), a dirty bomb (73.6%) or smallpox incident (64.8%).[274] Lastly, Smith et al. found that the willingness of paramedics decreased for situations that were non-conventional and less visible and the longer a disaster situation lasted for the more the perception of risk increased and willingness decreased.[275]

Fear/concern for self:

The review revealed eight quantitative studies and two qualitative studies that found that a fear or concern for one's own health or safety was a predictor of the willingness of employees to work for a range of scenarios. Adams and Berry reported that commonly expressed barriers to reporting to work were concern for self and the effect of the disaster on self.[276] In a study by Garrett, Park and Redlener, 18% of hospital workers selected 'personal safety concern' as the single most significant barrier to reporting to work.[277] Gershon et al. reported that the most common barrier to US home healthcare workers' willingness to work was fear for self and

[271] Lavonne M. Adams and Devon Berry, 'Who Will Show up? Estimating Ability and Willingness of Essential Hospital Personnel to Report to Work in Response to a Disaster', *Online Journal of Issues in Nursing* 17, no. 2 (March 2012).
[272] Gershon et al., 'Factors Associated with the Ability and Willingness of Essential Workers'.
[273] Hope et al., 'Willingness of Frontline Health Care Workers to Work During a Public Health Emergency'.
[274] Charles DiMaggio et al., 'The Willingness of U.S. Emergency Medical Technicians to Respond to Terrorist Incidents', *Biosecurity and Bioterrorism: Biodefense Strategy, Practice, and Science* 3, no. 4 (December 2005): 331–37.
[275] Smith et al., 'Paramedics' Perceptions of Risk and Willingness to Work during Disasters'.
[276] Adams and Berry, 'Who Will Show Up?'.
[277] Garrett, Park, and Redlener, 'Mitigating Absenteeism in Hospital Workers during a Pandemic'.

family's safety.[278] For two avian influenza/pandemic scenarios used in a study by Martinese et al., 70-80% of hospital staff in Australia selected the main reasons for not working as concerns for their own health and concerns for their family's health.[279] Similarly, Qureshi et al. found that the most frequently cited barriers for healthcare workers reporting during catastrophic disasters were personal health concerns and fear and concern for family and self.[280] Stergachis et al. reported that one of the most frequently reported barriers to the willingness of healthcare workers to report to work in the event of an earthquake or an influenza pandemic was a fear or concern for themselves, and in the case of the influenza pandemic, 'personal health problems' was also a frequently cited barrier.[281] Veeneema et al. found that perception of personal safety was the main determinant of nurses' willingness to respond to a radiological emergency.[282] A study by Wong et al. found that 29.2% of community nurses in Hong Kong reported that fear of being infected was a reason for being unwilling to care for patients during an H1N1 influenza pandemic.[283]

The two qualitative studies revealed similar findings: an interview study by Shaw et al. revealed that 55 out of 60 GPs would stop working in an influenza pandemic if personal protective equipment (PPE) was unavailable due to concerns for their own welfare; and in a qualitative study of paramedics in Australia, Smith et al. reported that concerns about threats to their health and wellbeing were frequently mentioned during discussions about working in a disaster.[284] [285]

Fear/concern for others:

The review revealed a number of quantitative studies and qualitative studies that found that a fear or concern for their significant others' health or safety was a predictor of employees'

[278] Robyn R. M. Gershon et al., 'Pandemic-Related Ability and Willingness in Home Healthcare Workers.', *American Journal of Disaster Medicine* 5, no. 1 (December 2009): 15–26.
[279] Franco Martinese et al., 'How Would Australian Hospital Staff React to an Avian Influenza Admission, or an Influenza Pandemic?', *Emergency Medicine Australasia* 21, no. 1 (February 2009): 12–24.
[280] Qureshi et al., 'Health Care Workers' Ability'.
[281] Stergachis et al., 'Health Care Workers' Ability and Willingness to Report to Work During Public Health Emergencies'.
[282] Tener Goodwin Veenema et al., 'Factors Affecting Hospital-Based Nurses' Willingness to Respond to a Radiation Emergency', *Disaster Medicine and Public Health Preparedness* 2, no. 4 (December 2008): 224–29.
[283] Eliza L.Y. Wong et al., 'Will the Community Nurse Continue to Function during H1N1 Influenza Pandemic: A Cross-Sectional Study of Hong Kong Community Nurses?', *BMC Health Services Research* 10 (April 2010): 107.
[284] Shaw et al., 'The GP's Response to Pandemic Influenza'.
[285] Smith et al., 'Paramedics' Perceptions of Risk and Willingness to Work during Disasters'.

willingness to work during a serious incident. As previously mentioned, studies by Gershon et al., Martinese et al. and Qureshi et al. found that a common barrier to reporting to work was fear or concern for their own health and their family's health.[286] [287] [288] Similarly, Adams and Berry found that a commonly expressed barrier to reporting to work was concern for others and the effect of the disaster on others, and in a study by Stergachis et al. one of the most frequently cited barriers to healthcare workers reporting to work during an influenza pandemic or an earthquake was fear or concern for their family.[289] [290] Further, Garrett, Park and Redlener reported that 'concern for safety of family' was the single most significant barrier to reporting to work in an influenza pandemic for 25% of hospital workers.[291] Shaw et al. reported that 55 out of 60 GPs said that they would stop working if PPE were unavailable due to concerns for the welfare of their dependents if they were to die.[292] A key finding of Young and Persell was that 90% of a sample of 95 nursing students in the US said they were not willing to work with contagious clients if transmission to their family was a possibility and there was no prophylactic help available to their family; however, it should be noted that this study had a small sample.[293] Lastly, Smith et al. reported that the way paramedics perceived risk was directly influenced by the potential for the incident to impact on their families, and they frequently mentioned concerns about the potential threat to the health and wellbeing of their families.[294]

Research has also shown that an employee's family can be an influence in ways other than the employee simply being concerned for their health or wellbeing. A key finding of Kim et al.'s study of nurses in Korea was that a significant predictor of intention to care for SARS patients was 'subjective norm', which was a measure of perceived approval or disapproval of significant others.[295] Tippett et al. reported that in the event of an influenza pandemic those prehospital medical care providers who perceived that their relationship partners were 'concerned' were less willing to work themselves.[296] Social stigmatism has also been shown to play a role, with

[286] Gershon et al., 'Pandemic-Related Ability'.
[287] Martinese et al., 'How Would Australian Hospital Staff React to an Avian Influenza Admission, or an Influenza Pandemic?'.
[288] Qureshi et al., 'Health Care Workers' Ability'.
[289] Adams and Berry, 'Who Will Show Up?'.
[290] Stergachis et al., 'Health Care Workers' Ability and Willingness to Report to Work During Public Health Emergencies'.
[291] Garrett, Park, and Redlener, 'Mitigating Absenteeism in Hospital Workers during a Pandemic'.
[292] Shaw et al., 'The GP's Response to Pandemic Influenza'.
[293] Young and Persell, 'Biological, Chemical, and Nuclear Terrorism Readiness'.
[294] Smith et al., 'Paramedics' Perceptions of Risk and Willingness to Work during Disasters'.
[295] Kim et al., 'Attitude, Beliefs, and Intentions to Care for SARS Patients'.
[296] Vivienne C. Tippett et al., 'Anticipated Behaviors of Emergency Prehospital Medical Care Providers during an Influenza Pandemic', *Prehospital and Disaster Medicine* 25, no. 1 (February 2010): 20–25.

Wong et al. reporting that healthcare workers and primary care physicians in Singapore would be concerned that people would avoid their families and themselves in an avian influenza pandemic.[297] [298] In a study by DiGiovanni et al., first responders and their partners were asked whether or not it was important to reach agreement as a couple on whether they would work; 26% of responders said that reaching agreement was essential compared to 53% of spouses who said concurrence was essential.[299] Finally, Wong et al., in 2010, surveyed community nurses in Hong Kong and found that those nurses who were unwilling or unsure about caring for a suspected H1N1 case generally reported a higher level of psychological stress, which included being concerned about their family catching the virus because of their job.[300]

Personal obligations:

A number of studies have found that childcare responsibilities were a frequently cited perceived barrier to reporting to work during an incident.[301] [302] [303] [304] [305] [306] [307] Similarly, Cone and Cummings found that in the event of a disaster, childcare was one of the most frequently selected support needs for hospital employees in the US.[308] In Ives et al.'s study a barrier to willingness to work in an influenza pandemic for healthcare workers in the US was 'prioritising the wellbeing of family members', and Damery et al. reported that females were less likely than males to work if children were ill, most likely due to the need to care for them; which could go some way to explaining the gender difference found in other research.[309] [310]

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[297] T.Y. Wong et al., 'Concerns, Perceived Impact and Preparedness in an Avian Influenza Pandemic : A Comparative Study between Healthcare Workers in Primary and Tertiary Care', *Annals of the Academy of Medicine, Singapore* 37, no. 2 (February 2008): 96–102.
[298] T.Y. Wong et al., 'A Cross-Sectional Study of Primary-Care Physicians in Singapore on Their Concerns and Preparedness for an Avian Influenza Outbreak', *Annals of the Academy of Medicine, Singapore* 37, no. 6 (June 2008): 458–64.
[299] DiGiovanni, Jr. et al., 'Community Reaction to Bioterrorism'.
[300] Wong et al., 'Will the Community Nurse Continue to Function during H1N1 Influenza Pandemic'.
[301] Adams and Berry, 'Who Will Show Up?'.
[302] Garrett, Park, and Redlener, 'Mitigating Absenteeism in Hospital Workers during a Pandemic'.
[303] Gershon et al., 'Pandemic-Related Ability'.
[304] Jonathan Ives et al., 'Healthcare Workers' Attitudes to Working during Pandemic Influenza: A Qualitative Study', *BMC Public Health* 9 (February 2009): 56.
[305] Ogedegbe et al., 'Health Care Workers and Disaster Preparedness'.
[306] Qureshi et al., 'Health Care Workers' Ability'.
[307] Stergachis et al., 'Health Care Workers' Ability and Willingness to Report to Work During Public Health Emergencies'.
[308] D.C. Cone and B.A. Cummings, 'Hospital Disaster Staffing: If You Call, Will They Come?', *American Journal of Disaster Medicine* 1, no. 1 (December 2006): 28–36.
[309] Ives et al., 'Healthcare Workers' Attitudes to Working during Pandemic Influenza'.
[310] Damery et al., 'Will the NHS Continue to Function'.

An association between having children or childcare responsibilities and willingness to work has been reported by a number of academic studies. For example: a key finding by Damery et al. was that those healthcare workers with caring responsibilities were significantly less likely to work during a pandemic than those without; Grimes and Mendias reported that being less likely to respond was associated with having dependent children; Mackler et al. found that having no children under the age of 18 was associated with a greater likelihood of remaining on duty (however it should be noted that this study had a small sample); Adams and Berry reported that a greater proportion of healthcare personnel with no responsibility for children were able and willing to report to work for multiple scenarios; Qureshi et al.'s findings showed that having childcare obligations was a correlate of healthcare workers being less willing to work in a number of catastrophic events; and lastly, Shapira et al. found that parents of children over the age of 14 years old were most willing to report to work in an unconventional missile attack in Israel.[311] [312] [313] [314] [315] [316]

However, other research has not found evidence of this association between having dependent children and intentions to report to work. Considine and Mitchell did not find a significant correlation between having carer responsibilities for children and willingness to participate in a CBR incident.[317] Research by both Irvin et al. and Syrett et al. found that being married or having children had no effect on willingness.[318] [319] Finally, Smith and Walton concluded that having dependents had less effect on attitudes to returning to work after an earthquake than they had expected.[320]

It is not just childcare obligations that have been linked to reporting to work, research has also shown an association between willingness to work and having eldercare responsibilities.[321] [322] Adams and Berry reported that a commonly expressed barrier to reporting to work was

[311] Ibid.
[312] Deanna E. Grimes and Elnora P. Mendias, 'Nurses' Intentions to Respond to Bioterrorism and Other Infectious Disease Emergencies', *Nursing Outlook* 58, no. 1 (January 2010): 10–16.
[313] Mackler, Wilkerson, and Cinti, 'Will First-Responders Show Up for Work During a Pandemic?'.
[314] Adams and Berry, 'Who Will Show Up?'.
[315] Qureshi et al., 'Health Care Workers' Ability'.
[316] Shapira et al., 'Willingness of Staff to Report to Their Hospital Duties Following an Unconventional Missile Attack'.
[317] Considine and Mitchell, 'Chemical, Biological and Radiological Incidents'.
[318] Irvin et al., 'Survey of Hospital Healthcare Personnel Response during a Potential Avian Influenza Pandemic'.
[319] James I. Syrett et al., 'Will Emergency Health Care Providers Respond to Mass Casualty Incidents?', *Prehospital Emergency Care* 11, no. 1 (January 2007): 49–54.
[320] Smith and Walton, 'Returning to Work after the Big One'.
[321] Ogedegbe et al., 'Health Care Workers and Disaster Preparedness'.
[322] Qureshi et al., 'Health Care Workers' Ability'.

responsibility for a spouse with healthcare needs/disability.[323] Furthermore, Cone and Cummings reported that 'pet care' was one of the most frequently selected support needs for hospital employees in the US during a disaster.[324]

Job role:

Balicer et al. compared the willingness to work of individuals in different job roles in their study of US local public health workers in 2006, and found that the likelihood of reporting to work was significantly higher for clinical staff compared to technical and support staff.[325] This finding, that clinical staff were more likely to report being willing to work than non-clinical staff has been supported by Bar-Dayan et al., and Basta, Edwards and Schulte.[326] [327] Furthermore, Crane et al. reported that pharmacists were the least likely to respond in all bioterrorism scenarios included in the study, compared to physicians and nurses.[328] The reasons for this were not fully established from the findings; however the researchers did note that pharmacists displayed major shortcomings in a number of clinical competencies associated with bioterrorism events. Similarly, Seale et al. discovered that non clinical staff were significantly more likely to be unsure of their intention with regards to reporting to work during an influenza pandemic in Australia.[329]

Further support for the idea that different job roles can influence willingness comes from Burke et al. who found that physicians were more likely to respond to a disaster than nurses and Irvin et al. who reported that doctors were more likely to be willing to work during an avian influenza pandemic than nurses or clerical/other associates.[330] [331] Damery et al., in their study of healthcare workers in UK concluded that when there was a personal infection risk during an influenza pandemic, doctors and GPs were most likely to continue to work despite

[323] Adams and Berry, 'Who Will Show Up?'.
[324] Cone and Cummings, 'Hospital Disaster Staffing'.
[325] Ran D. Balicer et al., 'Local Public Health Workers' Perceptions toward Responding to an Influenza Pandemic', *BMC Public Health* 6 (April 2006): 99.
[326] Bar-Dayan et al., 'Who Is Willing to Risk His Life'.
[327] Basta, Edwards, and Schulte, 'Assessing Public Health Department Employees' Willingness'.
[328] Jeffery S. Crane et al., 'Assessment of Community Healthcare Providers Ability and Willingness to Respond to Emergencies Resulting from Bioterrorist Attacks', *Journal of Emergencies, Trauma and Shock* 3, no. 1 (January 2010): 13–20.
[329] Seale et al., '"Will They Just Pack up and Leave?" - Attitudes and Intended Behaviour of Hospital Health Care Workers during an Influenza Pandemic'.
[330] Burke et al., 'Factors Associated with Willingness to Respond to a Disaster'.
[331] Irvin et al., 'Survey of Hospital Healthcare Personnel Response during a Potential Avian Influenza Pandemic'.

the risk compared to other healthcare workers such as ancillary workers and managers.[332] Similarly, one of the findings of Qureshi et al.'s research was that compared with physicians and emergency medical technicians, administrators, nurses, clinical support staff and all other job categories were less likely to report being willing to work.[333] Ehrenstein et al. also reported a difference between physicians and administrators in the percentage who disagreed that it would be professionally acceptable for healthcare professionals to abandon their workplace during a pandemic to protect themselves and their families; 65% of physicians disagreed compared to 32% of administrators.[334]

A small number of studies have compared different job roles that also included groups who were not healthcare workers. DiGiovanni et al. found that after a Rift Valley Fever virus outbreak was identified and recognised as bioterrorism, 95% of medical first responders said they would continue to work, compared to 71% of media workers and 65% of residents (made up of other community residents).[335] Gershon et al. discovered differences in the percentage of employees willing to report to work in a serious pandemic event between groups of essential workers; 74.1% of health employees, 78.3% of police employees, 69.9% of fire employees, 68.1% of emergency medical services personnel, 56.8% of hospital workers and 56.4% of correctional facility officers were willing to work.[336]

However, in contrast to the aforementioned research, Adams and Berry found that a greater proportion of those healthcare personnel with a non-clinical position would be willing to report to work during a chemical terrorism event and a smallpox outbreak compared to those who held a clinical position.[337] Other research has found no influence of job role on willingness to work: Daugherty et al. found no differences in the likelihood of healthcare workers reporting to work based on job title and Hope et al. found that the willingness of front line health staff to work did not differ by clinical status or job classification.[338] [339] With regards to

[332] Damery et al., 'Will the NHS Continue to Function'.
[333] Qureshi et al., 'Health Care Workers' Ability'.
[334] Ehrenstein, Hanses, and Salzberger, 'Influenza Pandemic and Professional Duty'.
[335] DiGiovanni, Jr. et al., 'Community Reaction to Bioterrorism'.
[336] Gershon et al., 'Factors Associated with the Ability and Willingness of Essential Workers'.
[337] Adams and Berry, 'Who Will Show Up?'.
[338] Elizabeth L. Daugherty et al., 'Survey Study of the Knowledge, Attitudes, and Expected Behaviors of Critical Care Clinicians Regarding an Influenza Pandemic', *Infection Control and Hospital Epidemiology* 30, no. 12 (December 2009): 1143–49.
[339] Hope et al., 'Willingness of Frontline Health Care Workers to Work During a Public Health Emergency'.

doctors and nurses, Katz et al. found that the percentage willing to work in a bioterrorist attack was the same for both groups (74%).[340]

Perceptions of importance of role/self-efficacy:

In their 2010 study, Balicer et al. concluded that the most influential factor associated with willingness to work for local public health workers during an influenza pandemic was the perception of the importance of one's role in the agency's overall response.[341] In their 2011 article, Balicer et al. reported that a significant predictor of willingness to respond to a radiological event was the perceived impact of one's response.[342] Similarly, Goodhue et al. reported that the most significant factor predicting the willingness of paediatric nurse practitioners to respond was having a specified role in the workplace disaster plan.[343] Smith and Walton, in their social network analysis research of local government staff in New Zealand found that the strongest influence on attitudes to returning to work after an earthquake was overall responsibility in the organisation; and staff who were not perceived to be as important were more likely to show a preference towards their responsibilities at home, or to feel they should stay away because they would be in the way if they went to work.[344] Ives et al. found that lack of information about what is expected of healthcare workers during an influenza pandemic was considered a barrier to their willingness to work.[345] Lastly, a key finding of Ko et al. in their survey of nurses in China was that self-efficacy (a measure of confidence in their ability to care for SARS patients) was a predictor of intention to care for SARS patients.[346]

Professional obligations and duty of care:

A number of studies have examined the influence of professional obligation and duty of care on healthcare workers' willingness to respond to serious incidents. For example, Alexander and Wynia reported that 40% of their sample of physicians in the US said they would be willing to put themselves at risk of contracting a deadly illness to save others' lives; however, this reduced to 33% who said they would care for infected smallpox patients even if

[340] Alan R. Katz et al., 'Hawaii Physician and Nurse Bioterrorism Preparedness Survey', *Prehospital and Disaster Medicine* 21, no. 6 (December 2006): 404–13.
[341] Balicer et al., 'Local Public Health Workers' Perceptions'.
[342] Balicer et al., 'Characterizing Hospital Workers' Willingness to Respond to a Radiological Event'.
[343] Goodhue et al., 'Willingness to Respond in a Disaster'.
[344] Smith and Walton, 'Returning to Work after the Big One'.
[345] Ives et al., 'Healthcare Workers' Attitudes to Working during Pandemic Influenza'.
[346] Ko et al., 'Applying Theory of Planned Behavior'.

unvaccinated.[347] Damery et al. also examined this issue and found that those healthcare workers in their UK sample who agreed that all healthcare workers have a duty to work were significantly more likely to say that they would report to work during an influenza pandemic than those who disagreed.[348] Furthermore, those who agreed that doctors and nurses have a duty to the sick were over four times more likely to work than those who disagreed, and lastly, those who agreed that their main responsibility was to themselves and their family were less likely to report that they would work than those who disagreed. Similarly, a study by Gullion showed that the willingness of school nurses in the US to care for patients during a bioterrorism incident (an outbreak of an unknown but potentially deadly illness) was positively correlated with their agreement that nurses have an obligation to care for a patient, even if doing so may put their life at risk.[349]

Further support was provided by DiMaggio et al., who surveyed emergency medical technicians in the US regarding their likely reasons for reporting to work during a terrorist incident.[350] They reported that 83.3% of respondents selected 'sense of responsibility' as a potential reason for not reporting and 69.9% selected 'code of ethics' as a reason. Similarly, Seale et al. reported that 74% of their sample of healthcare workers in China accepted the risk of getting pandemic influenza as part of their job, and another study found that 72.7% of a sample of nurses in Hong Kong accepted a personal risk of catching avian influenza in the course of their work.[351] Research from Singapore found that the majority of healthcare workers accepted the risk to their health from their occupation and falling ill with avian influenza.[352] [353] Lastly, Shabanowitz and Reardon found that 60.7% of healthcare workers in their US sample disagreed that it was ethical to abandon their workplace during a pandemic in order to protect themselves and their family; however, 64.5% agreed that they should be allowed to decide whether they report to work in a pandemic.[354]

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[347] G. Caleb Alexander and Matthew K. Wynia, 'Ready and Willing? Physicians' Sense of Preparedness for Bioterrorism', *Health Affairs (Millwood)* 22, no. 5 (September 2003): 189–97.
[348] S. Damery et al., 'Healthcare Workers' Perceptions of the Duty to Work during an Influenza Pandemic', *Journal of Medical Ethics* 36, no. 1 (January 2010): 12–18.
[349] Jessica Smartt Gullion, 'School Nurses as Volunteers in a Bioterrorism Event', *Biosecurity and Bioterrorism: Biodefense Strategy, Practice, and Science* 2, no. 2 (July 2004): 112–17.
[350] DiMaggio et al., 'The Willingness of U.S. Emergency Medical Technicians'.
[351] D. K. P. Tam, S. Lee, and S. S. Lee, 'Impact of SARS on Avian Influenza Preparedness in Healthcare Workers', *Infection* 35, no. 5 (October 2007): 320–25.
[352] Wong et al., 'Concerns, Perceived Impact and Preparedness in an Avian Influenza Pandemic'.
[353] Wong et al., 'A Cross-Sectional Study of Primary-Care Physicians in Singapore on Their Concerns and Preparedness for an Avian Influenza Outbreak'.
[354] Robert B. Shabanowitz and Judith E. Reardon, 'Avian Flu Pandemic – Flight of the Healthcare Worker?', *HEC Forum* 21, no. 4 (December 2009): 365–85.

Three qualitative studies have also reported findings related to healthcare workers' professional obligations. First, in a 2006 qualitative study in Australia, the GPs in the sample said they would continue to work during a pandemic and that declining to work would be unethical.[355] From this finding the researchers concluded that the GPs had a strong personal work ethic and had a sense of responsibility for the welfare of their patients. Second, a qualitative study of UK healthcare workers concluded that healthcare workers were motivated by a sense of obligation to work in an influenza pandemic, which the researchers described as 'a professional ethic', 'a duty to help' and 'a work ethic and confederate loyalty'.[356] Last, an interview and focus group study of paramedics in Australia found that when discussing their willingness to work during a serious incident, they spoke about their desire to fulfil their professional responsibilities.[357]

Other researchers have queried this association between professional ethics and willingness to work. Findings from academic studies have shown that it is not always as simple as a healthcare professional having a professional obligation or perception of a duty of care to their patients; there are other factors which could have a role to play. For example, Crane et al. found that although the majority of healthcare providers in their US sample were willing to respond to both a high risk event and a low risk event within their local community (81.7% and 82.8% respectively), the willingness reduced for events that were regional, and reduced further for events statewide, and further still for events nationwide.[358] Research has also shown that home healthcare workers were less willing to take care of new patients than they were to take care of their current patients in an influenza pandemic.[359]

Employer provisions:

Many of the studies included in the present review examined the effect of employer provisions on willingness to report to work, particularly provisions in the form of medical treatment. Ko et al. reported that one factor predicting nurses' intention to care for SARS patients was 'receiving resources from the hospital'.[360] A number of studies found that being provided with vaccination, medication and/or protective equipment was associated with increased

[355] Shaw et al., 'The GP's Response to Pandemic Influenza'.
[356] Ives et al., 'Healthcare Workers' Attitudes to Working during Pandemic Influenza'.
[357] Smith et al., 'Paramedics' Perceptions of Risk and Willingness to Work during Disasters'.
[358] Crane et al., 'Assessment of Community Healthcare Providers Ability and Willingness'.
[359] Gershon et al., 'Pandemic-Related Ability'.
[360] Ko et al., 'Applying Theory of Planned Behavior'.

willingness to work.[361] [362] [363] [364] [365] In one study this was defined as 'preferential access to antiviral medication', which when offered resulted in an increase in willingness to work scores, and in another study being offered the treatment on site was important; being offered the treatment at a remote site reduced the willingness rate by nearly half.[366] [367] Other studies defined vaccination, medication and/or protective equipment as frequently selected facilitators to reporting to work.[368] [369]

Some studies have reported that intention to work rates were lower for scenarios where vaccination, treatment or protective equipment either did not exist or was not made available to employees.[370] [371] [372] DiGiovanni et al.'s findings revealed that certain groups of employees may expect their employer to provide them with access to treatment, with 77% of media workers in the sample stating that if their work put them at risk they would expect their employers to provide protective measures and also necessary medication/treatment.[373]

Furthermore, research has shown that providing vaccination, medication or protective equipment for an employee's family is also something that could increase their willingness to work.[374] [375] [376] [377] [378] [379] In a qualitative study of GPs in Australia, it was stated that if public health authorities recommended them to take prophylactic antivirals then most GPs would

[361] Balicer et al., 'Characterizing Hospital Workers' Willingness to Report to Duty in an Influenza Pandemic'.
[362] Balicer et al., 'Characterizing Hospital Workers' Willingness to Respond to a Radiological Event'.
[363] Daugherty et al., 'Survey Study of the Knowledge, Attitudes, and Expected Behaviors of Critical Care Clinicians Regarding an Influenza Pandemic'.
[364] Olive Yonge et al., 'Willingness of University Nursing Students to Volunteer During a Pandemic', *Public Health Nursing* 27, no. 2 (March 2010): 174–80.
[365] Young and Persell, 'Biological, Chemical, and Nuclear Terrorism Readiness'.
[366] Garrett, Park, and Redlener, 'Mitigating Absenteeism in Hospital Workers during a Pandemic'.
[367] Syrett et al., 'Will Emergency Health Care Providers Respond to Mass Casualty Incidents?'.
[368] Gershon et al., 'Pandemic-Related Ability'.
[369] Martinese et al., 'How Would Australian Hospital Staff React to an Avian Influenza Admission, or an Influenza Pandemic?'.
[370] Mackler, Wilkerson, and Cinti, 'Will First-Responders Show Up for Work During a Pandemic?'.
[371] Sharon Dezzani Martin, 'Nurses' Ability and Willingness to Work during Pandemic Flu', *Journal of Nursing Management* 19, no. 1 (January 2011): 98–108.
[372] Martinese et al., 'How Would Australian Hospital Staff React to an Avian Influenza Admission, or an Influenza Pandemic?'.
[373] DiGiovanni, Jr. et al., 'Community Reaction to Bioterrorism'.
[374] Daugherty et al., 'Survey Study of the Knowledge, Attitudes, and Expected Behaviors of Critical Care Clinicians Regarding an Influenza Pandemic'.
[375] Garrett, Park, and Redlener, 'Mitigating Absenteeism in Hospital Workers during a Pandemic'.
[376] Gershon et al., 'Pandemic-Related Ability'.
[377] Mackler, Wilkerson, and Cinti, 'Will First-Responders Show Up for Work During a Pandemic?'.
[378] Martin, 'Nurses' Ability and Willingness to Work during Pandemic Flu'.
[379] Syrett et al., 'Will Emergency Health Care Providers Respond to Mass Casualty Incidents?'.

also want them for their families.[380] In addition, two studies reported that providing accommodation for employees and/or their families or having a safe place to bring children could encourage them to report to work.[381] [382] Shabanowitz and Reardon questioned the influence of employer provisions on willingness to work and reported that 21% of their sample of healthcare workers in the US said they would not volunteer to work during an avian influenza pandemic, even if they were provided with the following: PPE and training; specialised infectious disease training; life/disability insurance coverage for family; additional support for personal/family needs; priority medical treatment and vaccination if available; and hazard pay.[383]

The review has revealed mixed results with regards to the influence of additional financial incentives on the likelihood of staff reporting to work during a serious incident. Gershon et al. reported that being paid more money and being paid to stay home if sick were both considered facilitating factors in an influenza pandemic.[384] Masterson et al. reported that increased pay, increased compensation time and disability coverage were the most influential incentives for employees considering whether to respond in a serious incident; however, the incentives had less influence during biological incidents than during a conventional or radiological incident.[385] Burke et al. reported that those paediatric healthcare employees who said they needed compensation were less willing to respond to a disaster than those who said they might not or did not need it.[386] Other research findings have suggested that financial incentives may not be enough to encourage employees who are unsure about their intentions to come back to work. For example, Irvin et al. found that for 19% who answered 'maybe' to whether they would be willing to work if avian flu patients were being treated at the hospital, financial incentives (even triple pay) would not make a difference to their willingness.[387] Similarly, a study by Martin reported that offering double or triple pay did not significantly affect nurses' willingness to respond to an influenza pandemic.[388]

[380] Shaw et al., 'The GP's Response to Pandemic Influenza'.
[381] Martinese et al., 'How Would Australian Hospital Staff React to an Avian Influenza Admission, or an Influenza Pandemic?'.
[382] Gershon et al., 'Pandemic-Related Ability'.
[383] Shabanowitz and Reardon, 'Avian Flu Pandemic – Flight of the Healthcare Worker?'.
[384] Gershon et al., 'Pandemic-Related Ability'.
[385] Masterson et al., 'Willingness to Respond'.
[386] Burke et al., 'Factors Associated with Willingness to Respond to a Disaster'.
[387] Irvin et al., 'Survey of Hospital Healthcare Personnel Response during a Potential Avian Influenza Pandemic'.
[388] Martin, 'Nurses' Ability and Willingness to Work during Pandemic Flu'.

Perceptions of employer:

Irvin et al. reported that for those healthcare workers unsure about their intentions to report to work in an avian influenza pandemic, the most important facilitating factor was their confidence that the hospital could protect them.[389] Bar-Dayan et al. discovered that healthcare workers' willingness to risk one's life for a patient during an A/H1N1 pandemic in Israel was significantly lower for those with less trust in workplace preparedness and in the effectiveness of safety measures.[390] DiGiovanni et al. in their study of a hypothetical Rift Valley Fever Virus outbreak reported that in all groups (medical first responders, their spouses, media workers and other community residents), most participants would continue to work provided their work sites were adequately protected.[391] Similarly, Gershon et al.'s study revealed that having two or more workplace pandemic preparedness elements was significantly associated with willingness to work.[392] These preparedness elements included: respirator training; respirator fit-testing; pandemic influenza training; and the workplace having established pandemic plans. A further study by Gershon et al. reported that a frequently selected facilitator for willingness to work was being confident a mask would protect them in an influenza pandemic.[393]

Although no studies have examined the influence of organisational identification on willingness to work (as discussed in Chapter 1), Gershon et al. reported that a measure of organisational trust/shared values was associated with essential workers' willingness to work in a serious pandemic event.[394] Similarly, a qualitative study by Ives et al. found that healthcare workers were motivated by a sense of 'confederate loyalty', and that barriers to willingness to report to work included a lack of trust in, and goodwill towards, the NHS and a feeling that employers do not take the needs of staff seriously.[395] Lastly, Tippett et al., in their study of emergency prehospital medical care providers in Australia, reported that increased willingness to work was associated with high confidence in employer.[396]

[389] Irvin et al., 'Survey of Hospital Healthcare Personnel Response during a Potential Avian Influenza Pandemic'.
[390] Bar-Dayan et al., 'Who Is Willing to Risk His Life'.
[391] DiGiovanni, Jr. et al., 'Community Reaction to Bioterrorism'.
[392] Gershon et al., 'Factors Associated with the Ability and Willingness of Essential Workers'.
[393] Gershon et al., 'Pandemic-Related Ability'.
[394] Gershon et al., 'Factors Associated with the Ability and Willingness of Essential Workers'.
[395] Ives et al., 'Healthcare Workers' Attitudes to Working during Pandemic Influenza'.
[396] Tippett et al., 'Anticipated Behaviors of Emergency Prehospital Medical Care Providers during an Influenza Pandemic'.

Ability to get to work and perform duties:

This review has been focused on staff willingness to report to work; however, it is also important to consider their ability to report to work. Research has found an association between the two concepts. For example, Balicer et al.'s 2010 study found that perceived ability to perform one's duties was a significant predictor of hospital employees' willingness to work in an influenza pandemic.[397] Similarly, Balicer et al.'s 2011 study revealed that perceived ability to perform one's duties and perceived confidence about getting to work safely were both significant predictors of hospital employees' willingness to work during a radiological event.[398] An association between perceived ability to perform one's duties and willingness was also discovered by Goodhue et al. who surveyed paediatric nurse practitioners in the US and found that those who felt 'definitely prepared' for a disaster in general were more likely to be willing to respond than those who did not feel prepared.[399]

A number of studies have also found that transportation problems are a frequently selected barrier to employees' ability to report to work during a serious incident.[400] [401] [402] [403] In addition, Burke et al. reported that employees who said they needed transportation in the event of a disaster were less willing to respond than those who did not or might not need it.[404]

Knowledge and information:

Several studies in this review have examined the association between actual or perceived knowledge related to an incident and willingness to work, as well as looking at the different types of information available. Balicer et al. showed that a significant predictor of willingness was level of perceived knowledge of pandemic events.[405] Martin's 2011 study stated that although 90.1% of the sample of nurses were willing to work during an influenza pandemic,

[397] Balicer et al., 'Characterizing Hospital Workers' Willingness to Report to Duty in an Influenza Pandemic'.
[398] Balicer et al., 'Characterizing Hospital Workers' Willingness to Respond to a Radiological Event'.
[399] Goodhue et al., 'Willingness to Respond in a Disaster'.
[400] Gershon et al., 'Pandemic-Related Ability'.
[401] Ives et al., 'Healthcare Workers' Attitudes to Working during Pandemic Influenza'.
[402] Qureshi et al., 'Health Care Workers' Ability'.
[403] Stergachis et al., 'Health Care Workers' Ability and Willingness to Report to Work During Public Health Emergencies'.
[404] Burke et al., 'Factors Associated with Willingness to Respond to a Disaster'.
[405] Balicer et al., 'Characterizing Hospital Workers' Willingness to Report to Duty in an Influenza Pandemic'.

fewer (83%) felt knowledgeable enough to safely care for pandemic flu patients.[406] Similarly, another study found that only 18.9% of senior medical students considered themselves to be sufficiently educated regarding H5N1, which may go some way to explaining why fewer students were willing to treat children (41.1%) than pandemic patients overall (82.3%).[407] In Bar-Dayan et al.'s 2010 study of healthcare workers in Israel, 84% who had read a scientific article about A/H1N1 influenza were willing to risk their lives for a patient, compared to 73% who had not.[408] They also found that healthcare workers' willingness was not related to obtaining information from lay information sources such as television, newspapers or the internet.

Similarly, a study by Basta, Edwards and Schulte found that public health department employees who had read either the state or country pandemic influenza plan were significantly more likely to report a willingness to respond during an influenza pandemic when face-to-face duties were required.[409] However, Daugherty et al. concluded that healthcare workers' confidence in their knowledge of how to protect themselves during an influenza pandemic had no effect on their likelihood of reporting to work.[410]

In a study by Veenema et al., baseline knowledge and clinical competence were both positively associated with the willingness of nurses In Taiwan to respond to a radiological emergency.[411] Furthermore, Bar-Dayan in their 2011 study, reported that willingness to risk one's life for a patient with A/H1N1 was lower for those with less knowledge about safety measures.[412] DiGiovanni et al. found that most respondents would continue to work in a Rift Valley Fever Virus outbreak provided they received information about medical issues, particularly transmission and prevention.[413] Conversely, Ives et al., in their qualitative study found that a barrier to reporting to work in an influenza pandemic was a lack of information about the risks.[414]

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[406] Martin, 'Nurses' Ability and Willingness to Work during Pandemic Flu'.
[407] Luc J.M. Mortelmans et al., 'Are Belgian Senior Medical Students Ready to Deliver Basic Medical Care in Case of a H5N1 Pandemic?', *Prehospital and Disaster Medicine* 24, no. 5 (September 2009): 438–42.
[408] Yaron Bar-Dayan et al., 'Relationship Between Sources of Information and the Willingness of Healthcare Workers to Risk Their Lives for a Patient During the Peak of A/H1N1 Pandemic', *The Open Epidemiology Journal* 3 (2010): 53–57.
[409] Basta, Edwards, and Schulte, 'Assessing Public Health Department Employees' Willingness'.
[410] Daugherty et al., 'Survey Study of the Knowledge, Attitudes, and Expected Behaviors of Critical Care Clinicians Regarding an Influenza Pandemic'.
[411] Veenema et al., 'Factors Affecting Hospital-Based Nurses' Willingness to Respond to a Radiation Emergency'.
[412] Bar-Dayan et al., 'Who Is Willing to Risk His Life'.
[413] DiGiovanni, Jr. et al., 'Community Reaction to Bioterrorism'.
[414] Ives et al., 'Healthcare Workers' Attitudes to Working during Pandemic Influenza'.

The importance of providing accurate information to staff during an incident was shown in a study of student nurses by Young and Persell, where it was found that the students' concerns for safety (self and family) were based on inaccurate knowledge about some of the agents concerned.[415] In fact when asked about anthrax (inhalation), 80% were concerned about their own safety and 75% were concerned for their family's safety, when in reality anthrax is non-contagious from human-to-human. Further, with regards to treating victims of a chemical incident who had been decontaminated, 54% were concerned for themselves and 58% were concerned for their families; the student nurses in the study seemed to be unaware that there would be little or no risk to themselves or their families when treating a patient who had already been decontaminated. It must be noted that this study was conducted using a relatively small sample of student nurses and the results may not generalise to the wider nursing population, particularly those with more experience and training.

Training:

Gershon et al. tested the effect of pandemic preparedness training on willingness to work; the training involved an educational intervention and a skill-based drill with respiratory protective equipment (RPE).[416] The researchers reported that willingness to work increased from 63% before the training to 66% after the training and that the training was effective at increasing pandemic knowledge and behavioural intentions (use of RPE and vaccination). A further study by Gershon et al. found that pandemic influenza training was significantly associated with essential workers' willingness to work during a serious pandemic event.[417] Goodhue et al. reported that disaster training was a significant predictor of paediatric nurse practitioners' willingness to work in a disaster.[418] Wong et al. discovered that 74.5% of their sample of community nurses in Hong Kong wanted more training and professional educating regarding how to deal with H1N1 influenza.[419]

Perceived adequate education and training has been associated with increased willingness to work during an influenza pandemic in a study by Tippett et al.[420] However, Considine and

[415] Young and Persell, 'Biological, Chemical, and Nuclear Terrorism Readiness'.
[416] Robyn R.M. Gershon et al., 'Evaluation of a Pandemic Preparedness Training Intervention for Emergency Medical Services Personnel', *Prehospital and Disaster Medicine* 24, no. 6 (November 2009): 508–11.
[417] Gershon et al., 'Factors Associated with the Ability and Willingness of Essential Workers'.
[418] Goodhue et al., 'Willingness to Respond in a Disaster'.
[419] Wong et al., 'Will the Community Nurse Continue to Function during H1N1 Influenza Pandemic'.
[420] Tippett et al., 'Anticipated Behaviors of Emergency Prehospital Medical Care Providers during an Influenza Pandemic'.

Mitchell only found a weak positive correlation between training adequacy and willingness to participate in a chemical incident; and this did not apply to biological or radiological incidents.[421] It should be noted that Considine and Mitchell's study had a small sample for quantitative research of 64 emergency department nurses.

Discussion

The systematic literature review revealed that a range of factors could potentially influence an employee's decision whether or not to work in the event of a serious incident or disaster. These include:

- Incident type
- Fear/concern for self
- Fear/concern for others
- Personal obligations
- Job role
- Perception of importance of role/self-efficacy
- Professional obligations and duty of care
- Employer provisions
- Perceptions of employer
- Ability to get to work and perform duties
- Knowledge and information
- Training

The first influential factor to be discussed is the type of incident or hypothetical scenario. The type of incident had an effect on the willingness of employees (particularly healthcare workers) to report to work. Those incidents considered unconventional or unfamiliar, and particularly those with a perceived risk of contagion or contamination, are likely to cause more concern than more conventional incidents such as mass casualty or weather related incidents. This is most likely because these types of incidents cause a higher level of fear or concern with regards to personal health or safety or that of significant others. The concern that employees feel for themselves and their families has been shown to be a strong influence on their

[421] Considine and Mitchell, 'Chemical, Biological and Radiological Incidents'.

willingness to work, particularly in the case of an infectious disease where there is an associated fear of catching it at work and then going home and passing it on.

The implications of these findings for organisations are that they may experience higher levels of staff absenteeism for CBRN incidents and infectious disease outbreaks than for conventional incidents or those without a contagious element or contamination. This is a conclusion supported by the risk perception literature which has found that risks that are deemed uncontrollable, unfamiliar, catastrophic, cause feelings of dread, potentially unknown to those exposed and have serious consequences in terms of causing death are the ones that cause the greatest level of concern for individuals.[422] CBRN incidents and infectious disease outbreaks would score highly on many of these qualitative attributes. In light of this, organisations should focus their planning on the types of incidents that are likely to result in the greatest rates of staff absenteeism, such as CBRN terrorist attacks and potentially fatal infectious disease outbreaks. They could do this by using these types of scenarios in their simulations/exercises. These recommendations are discussed further in Chapter 6.

The responsibilities employees have to care for others are a potential influence on their willingness and ability to go to work during a serious incident, particularly children; however it is unclear whether simply having children has an effect on its own without knowing if the parent has sole responsibility for childcare in the household. A number of studies included in the review reported that females were less likely to report to work in a serious incident than males; however, the reasons for this need further examination. One study reported that females were less likely than males to report to work if children were ill, which is something that could go some way to explain the gender difference; however, it needs to be supported by future research findings.[423] These findings are not surprising when role conflict theory is applied to them. Role conflict theory suggests that in a disaster individuals experience a 'role conflict' between the roles they play in different groups, such as their family group and other groups (i.e. their employment group).[424] Killian used the example of a ship explosion in Texas City and described how the majority of individuals who experienced a role conflict between the family and other groups resolved this in favour of loyalty to their families. Therefore, it would be wise for organisations to consider the potential strong influence an employee's family could have on their decisions concerning whether or not to report to work during an

[422] Fischhoff et al., 'How Safe Is Safe Enough?'.
[423] Damery et al., 'Will the NHS Continue to Function'.
[424] Killian, 'The Significance of Multiple-Group Membership in Disaster'.

extreme event. Organisations should also focus on strategies that consider the needs of the significant others of their staff, such as the provision of childcare.

A further influence on employees' willingness to work is their job role. The review revealed that clinical workers were more willing than non-clinical workers to report to work during an extreme event and, similarly, physicians were more willing than nurses. However, it is unclear whether this is simply because clinical workers and physicians have more skills or knowledge related to the response. Alternatively it could be their confidence in their skills and knowledge that is more important. One study to report contradictory findings was that of Adams and Berry, who found that a greater proportion of non-clinical personnel than clinical personnel were able and willing to report to work during a chemical terrorism event or smallpox epidemic.[425] The researchers offer a potential explanation for this, which is that non-clinical essential personnel may have fewer people per department and so are more critical to the response. They also suggest that it is possible non-clinical personnel are socialised to anticipate their 'essentialness' to a greater extent than clinical staff who know they are more easily replaced due to their numbers. Furthermore, the researchers also discuss the possibility that clinical staff could be influenced by their increased risk of exposure to patients with infectious disease or chemical contamination. However, these questions need to be explored further due to this result differing from the findings of other studies. It is also difficult to generalise any of the findings related to the influence of clinical job roles to other occupational groups given the unique role that healthcare workers would play in the response to an extreme event.

Overall, this review has found that the majority of studies examining the differences between job roles have reported that clinical workers and first responders are more likely to report to work than non-clinical workers and other job roles. Evidence suggests that professional obligation or duty of care could potentially be the mediating factor in the willingness of healthcare workers to report to work during a public health emergency. However, it is unclear from the limited research with non-healthcare workers whether individuals in other occupations would also experience the same professional obligation or duty to return to work. It is possible that employees' motivations to report to work might be different depending on whether their role is directly related to the incident response (such as emergency responders and physicians) or whether their role is not directly related to the incident response but they would still be affected in some way by the incident or the recovery (such as financial services or energy sector employees). This potential relationship between job roles, centrality with

[425] Adams and Berry, 'Who Will Show Up?'.

regards to the incident response and motivations to report to work is not something that has been examined in the studies included in this review, and as such is a subject that should be the focus of future research. When focusing on healthcare workers and their willingness to report to work in the future, it would be interesting to look at whether there are differences in those who provide care for specific groups such as older adults or young children, or whether there are variations in behavioural intentions between physicians with different specialisms.

The review has shown that perceived importance of their role and self-efficacy could have an influence on an employee's decision to report to work during a serious incident, but again in the context of healthcare workers responding.[426] [427] These results can provide support for the EPPM, a threat and efficacy based model.[428] The efficacy part of the model, which is of interest here, is separated into 'perceived response efficacy' which is the individual's belief as to whether the response can prevent the threat, and 'perceived self-efficacy' which is their belief in their own ability to perform the recommended response. The research identified in this review supports the influence that self-efficacy can play on behavioural responses, in this case the willingness of staff to report to work. In light of this it is recommended that organisations focus on increasing employees' perceptions of self-efficacy. They should do this by communicating to staff the importance of their role in an emergency, as well as how they as individuals can contribute to both the response and the recovery of the organisation.

Employer provisions particularly in the form of medication, vaccinations or personal protective equipment could encourage employees to return to work during a serious incident. The review also revealed that providing these interventions to the families of the employees as well as the employee themselves is also a motivating factor. However, there will be some employees for whom nothing will persuade them to come to work, particularly during an infectious disease outbreak. Furthermore, mixed findings on the usefulness of companies offering financial incentives to encourage employees to come to work have been highlighted by this review. The implications of these findings for employers are that the interventions with the best chance of encouraging staff to return to the workplace are the ones that protect their health or increase the perception that their health is being protected. It is therefore recommended that organisations include strategies to provide medical incentives to the employees and to their families where possible. However, it is vital that these interventions are designed to sit alongside current NHS policies and adhere to the relevant legislation, and, most importantly,

[426] Balicer et al., 'Characterizing Hospital Workers' Willingness to Respond to a Radiological Event'.
[427] Ko et al., 'Applying Theory of Planned Behavior'.
[428] Witte, 'Putting the Fear Back into Fear Appeals'.

are part of a coordinated response between medical providers. It is also suggested that employers make personal protective equipment and hygiene-based interventions (such as hand gels) conspicuous in the workplace.

With regard to employee perceptions of their employer, a number of studies in this review have shown this to be an influence on willingness to work. Perceptions of workplace safety are something that has been linked to willingness to respond, as is being confident in, or trusting, an employer. The finding by Gershon et al. that organisational trust/shared values is associated with willingness to work is something that warrants further investigation, particularly as it relates to the theory of organisational identification.[429] [430] Organisational Identification is a construct with its roots in Social Identity Theory and can be described as the extent to which an individual identifies with their organisation, particularly with the organisation's values, norms and goals.[431] [432] Consequently, it is possible that those individuals with higher levels of organisational identification, who have shared values and who experience the successes and failures of the organisation as their own, will be willing to report to work during an extreme event.[433]

The findings concerning the influence that knowledge and training has on employees' willingness to work in a serious incident are mixed, particularly when separating out the influences of actual knowledge versus perceived knowledge. One potential association that warrants further investigation was Bar-Dayan et al.'s finding that reading a scientific article about A/H1N1 influenza had a stronger relationship to healthcare workers' willingness to work than when lay sources of information were used.[434] Therefore, it is potentially the quality and the source of the information they receive that is important, rather than simply having any information about the potential risk. However, it is possible that there are confounding variables that the researchers did not control for that could be a predictor of whether someone reads a scientific article, such as their personality type, risk perception, professional development goals or general interest in learning about A/H1N1.

[429] Gershon et al., 'Pandemic-Related Ability'.
[430] Mael and Ashforth, 'Loyal From Day One'.
[431] Henri Tajfel and John Turner, 'An Integrative Theory of Intergroup Conflict'.
[432] S. Alexander Haslam and Michael J. Platow, 'The Link between Leadership and Followership: How Affirming Social Identity Translates Vision into Action', *Personality and Social Psychology Bulletin* 27, no. 11 (November 2001): 1469–79.
[433] Mael and Ashforth, 'Alumni and Their Alma Mater'.
[434] Bar-Dayan et al., 'Relationship Between Sources of Information'.

The risk communication literature also supports the suggestion that people should be provided with accurate, scientific information during a public health emergency. For example, Pearce et al. used focus groups to examine public reactions and information needs during a hypothetical incident involving an RED.[435] The findings revealed that by providing accurate information, researchers were able to improve participants' understanding of the actual risks to their health. This meant they were able to take appropriate actions during the scenario and not attend healthcare facilities unnecessarily. It is vital that employers provide their staff with accurate information concerning the risks they could face by going to work, keeping in mind that without the facts, employees could be under or overestimating the risks to their health and that of their significant others.

With regards to training, the results are again somewhat mixed; however, a small number of studies found training or perceived adequate training was linked to willingness and that employees wanted more training. Gershon et al. provided the only study in which a specific intervention was tested and discovered that pandemic preparedness training led to a significant increase in willingness to work, and that the training increased levels of knowledge.[436] However, it should be noted that the study used a small sample of 129 emergency medical services personnel and that the post-test was conducted immediately after the training, so it is unclear if the change in behavioural intentions and knowledge levels would persist long-term. It has been suggested that an 'information void' could occur during a CBRN incident due to potentially low levels of knowledge amongst members of the public.[437] Barnett et al. suggest that this would be likely to affect an employee's decision whether or not to report to duty.[438] The risk perception literature has discussed the idea that unfamiliar risks are likely to cause greater levels of concern in the public than those risks they are faced with regularly.[439] Therefore, providing training to employees about CBRN incidents could potentially increase their familiarity with the risks, thus reducing their level of concern and enabling them to select the most appropriate actions.

[435] Pearce et al., 'Communicating with the Public Following Radiological Terrorism'.
[436] Gershon et al., 'Evaluation of a Pandemic Preparedness Training'.
[437] Barnett et al., 'Applying Risk Perception Theory to Public Health Workforce Preparedness Training', S35.
[438] Ibid.
[439] Fischhoff et al., 'How Safe Is Safe Enough?'.

Limitations of current research

As with all research involving hypothetical scenarios, a limitation of this type of research is that it raises the question of whether self-reported behavioural intentions transfer into actual behaviour. There is also the question of whether there is evidence of heroic reporting due to the professional obligations or duty of care ethics healthcare workers must abide by and whether reading a scenario on paper provides enough realism for an individual to judge their willingness. There is some evidence of these issues in the study of Alexander and Wynia who reported that 40% of their sample of physicians said they would be willing to put themselves at risk of contracting a deadly illness to save others' lives; however, when given a specific scenario this percentage reduced and only 33% said they would care for infected smallpox patients if they themselves had not received a vaccine.[440] Therefore, it is possible that generic questions about professional obligations elicit a more positive response in terms of willingness than when individuals are presented with a more specific scenario and that giving more information helps the individual to imagine the scenario and to conduct a personal risk assessment. Therefore, for the present research it will be important to provide details about the specific scenario and name the agents involved, for example 'pneumonic plague outbreak' rather than simply 'bioterrorist incident'. This approach was used when developing the scenario for use in the focus group study (Chapter 5).

Some of the survey studies included in this review had particularly small samples (n<100) and so it is difficult to generalise their findings to a larger population. Furthermore, many of the studies used web surveys, requiring respondents to be connected to the internet. In addition, the majority of the studies in the review did not apply any established theoretical frameworks to the research. A number of psychological theories and models that could be used to understand the drivers underlying employees' decisions to return to work were presented in Chapter 1, and have been considered again here. These theoretical frameworks could help guide researchers to understand the factors that mediate employee decisions and inform the development of effective interventions.

A further limitation of the research included in the present review is that the vast majority of studies included samples who were just healthcare workers. It is therefore difficult to generalise these findings to other employment groups, particularly due to the nature of the role healthcare workers would have in extreme events. In addition, as mentioned by Adams and Berry in relation to their own study, despite the surveys being anonymous, participants

[440] Alexander and Wynia, 'Ready and Willing?'.

may have not wanted to answer honestly if they were not willing to work in case their employer were to find out.[441]

Limitations of systematic literature review

Despite extensive database and ancestry searching it is possible that studies may have been missed; however, due to the increase in studies included in this review compared to the two previous systematic literature reviews conducted by Chaffee and Smith, it is not likely that many have been missed. Due to time constraints the systematic literature search ended in August 2012 and it is quite likely that more studies or reviews have been published on this topic since that time (see Chapter 6). It should also be noted that due to the nature of the topic it is possible that relevant data has been collected and published in industry publications, which are not peer-reviewed or accessible via the databases used for this literature search, and so could not be included in the present systematic review.

Conclusions and Recommendations

As discussed by Chaffee at the end of her systematic literature review into the willingness of healthcare personnel to work in a disaster, the findings of the hypothetical incident studies included in this review should be considered in relation to studies that examine how employees have behaved in actual disasters.[442] These findings will also be used in conjunction with the findings from the original research presented in this thesis in order to formulate a series of evidence-based recommendations for organisations. These recommendations can then be used to build a resilient workforce and help to prevent high levels of staff absenteeism in the event of disaster.

The vast majority of research in this area has focused solely on healthcare workers. It is vital the concept of willingness to work is applied to other sectors of national infrastructure, as understanding the likely behaviour of employees is something that would be invaluable to all organisations faced with disruption. Future research should involve groups of employees from a range of organisations and sectors to investigate if these individuals experience the same influences on their decisions about reporting to work as healthcare workers, or whether there

[441] Adams and Berry, 'Who Will Show Up?'.
[442] Chaffee, 'Willingness of Health Care Personnel to Work in a Disaster'.

are different factors involved. The present review also revealed a limited number of studies which were based on theoretical frameworks. Future research should consider applying other theories to the topic, such as risk perception theory, organisational identification, job satisfaction and role conflict theory (see Chapter 1).

The majority of research in this area has looked at the likely behaviour of employees, but has not compared this with the assumptions of the employers/decision-makers. One report which goes some way to doing this entitled, 'Preventing Absenteeism and Promoting Resilience Among Health Care Workers in Biological Emergencies' was discovered during the present review but not included as it was not peer-reviewed.[443] The report was prepared for the US Department of Energy and contains a brief review of past survey data, as well as including some primary data consisting of 28 interviews with a range of individuals such as civilian and military physicians involved in emergency response planning, nurse managers, state public health officials and others. Although a useful report, this type of research needs to be conducted with key decision-makers in organisations in sectors other than health. Finally, more qualitative research needs to be carried out in this topic area, examined alongside the quantitative data in order to provide a deeper understanding of the underlying drivers of employees' decision-making in the event of a serious incident such as a CBRN terrorist attack.

The findings from this systematic literature review were used to inform the interview guide used in the interview study (Chapter 3). The themes revealed through this review process formed the basis of some of the questions and prompts used in the semi-structured interviews with resilience professionals, in order to examine if they had considered these potential influences on their employees' decisions. Similarly, the predictor variables found in the reviewed studies were included in the web survey of this research (Chapter 4) to investigate if they also applied to employees who work in sectors other than the health sector. Furthermore, the findings from this review informed the decision to select a deliberate infectious disease release as the focus group scenario (Chapter 5). Finally, the results of many of the studies reviewed in this chapter have been used to provide further support for the organisational recommendations that are presented in Chapter 6.

[443] A.M. Lesperance and J.S. Miller, 'Preventing Absenteeism and Promoting Resilience Among Health Care Workers in Biological Emergencies' (Pacific Northwest National Laboratory, August 2009), http://www.pnl.gov/main/publications/external/technical_reports/PNNL-18405.pdf.

Chapter 3: Interview Study

Introduction

When organisations create their business continuity plans, they must make assumptions regarding the numbers of staff who are likely to be at work during a major incident. One of the key aims of the research presented in this thesis was to examine likely staff behaviour in extreme events from the employer's viewpoint. This, in turn, was expected to shed light on the assumptions that national infrastructure employers are making about the behaviour of their staff within their business continuity plans.

Past research has revealed a number of inaccurate and contradictory assumptions that are held by emergency responders about how the public will respond to emergency situations; for example, that they will panic and will not follow instructions.[444] [445] These assumptions have implications for emergency planning and have the potential to hinder emergency response.[446] It is possible that equally unrealistic assumptions may be held by resilience professionals about the likely behaviour of staff in national infrastructure organisations. This study will use interviews with business continuity managers and other resilience professionals at national infrastructure organisations to ascertain whether or not similar assumptions about human behaviour are present.

Chapters 1 and 2 argued that, with the exception of the previously mentioned US Department of Energy report into decision-maker perceptions of the issues surrounding healthcare staff absenteeism in biological emergencies, there are very few examples of peer-reviewed qualitative research studies in the area of staff willingness to work during extreme events.[447] Despite the fact that the US Department of Energy report is not peer-reviewed, it is the most relevant research to the present interview study to have been conducted to date, containing some useful findings; and, as such, is cited a number of times in the present chapter. In light of

[444] Pearce et al., 'CIE Toolkit WP8: Risk and Crisis Communication Requirements Following a Chemical Incident or Emergency. Unpublished Report to the European Commission'.
[445] Holly Elisabeth Carter et al., 'Emergency Responders' Experiences of and Expectations Regarding Decontamination'.
[446] Rogers and Pearce, 'Risk Communication, Risk Perception and Behavior'.
[447] Lesperance and Miller, 'Preventing Absenteeism and Promoting Resilience Among Health Care Workers in Biological Emergencies'.

the sampling limitations of the aforementioned US report, the present study is the first of its kind to interview decision-makers in all sectors of national infrastructure about their assumptions of the likely behaviour of their staff in extreme events, such as those associated with a CBRN hazard.

The present study consisted of a series of semi-structured interviews (n=21) conducted with individuals who have current or former responsibilities for the business continuity, crisis management or overall resilience of national infrastructure organisations in the UK. The purpose of the interviews was to examine the interviewees' opinions and experiences related to their employees' willingness and ability to work during an extreme event. An interview study was considered the most suitable method because a significant level of detail was needed on the specific and unique experiences of each interviewee with regards to the organisation they work for or previous incidents they had been involved in.

The aims of this study were to ascertain:

1. What business continuity managers and resilience professionals believe are the best ways to plan for disruption.
2. How business continuity managers and resilience professionals perceive the likely behaviour of employees during an extreme event, particularly CBRN incidents.
3. How business continuity managers and resilience professionals plan to address the barriers and facilitators to employees' willingness and ability to work in the event of a serious incident.
4. What assumptions business continuity managers and resilience professionals are making based on their experience of past incidents or individual beliefs.

This approach of comparing the assumptions of decision-makers at organisations in a variety of sectors of national infrastructure to the self-reported likely behavioural responses of employees is novel, and, as such, has the potential to provide a unique contribution, not just to the academic theory but to organisational policy and practice.

Method

Design and procedure

21 semi-structured interviews were conducted between August 2012 and July 2013. The majority of interviews took place at the participants' places of work, one took place at King's College London and two interviews were conducted as telephone interviews. Participants were recruited either through contacts of the organisation funding this research, the PhD advisory board or as a result of networking. Each participant was contacted by email to ask if they were interested in taking part and provided with the study information sheet, after which a convenient meeting time and place were arranged. The interviews lasted between 30 and 90 minutes and all were audio-recorded. Participants signed a consent form to acknowledge that they understood they could withdraw from the study at any time and that their contribution would be anonymised. The study was approved by the KCL War Studies Group Research Ethics Panel (REP(WSG)/11/12-28).

Participants

All 21 interviewees had responsibilities (or former responsibilities) for business continuity, crisis management or resilience at a national infrastructure organisation in the UK. Job titles of the interviewees included: 'Head of Business Continuity', 'Emergency Planning Manager', 'Business Continuity Manager' and 'Head of Business Continuity and Crisis Management' amongst others. Sectors included in the study were: finance, energy, water, food, transport, communications, health, emergency services and local and central Government. 20 out of the 21 participants were male, 19 were based in England, 1 in Scotland and 1 in Wales. The participants' ages ranged from 28 to 64. Several of the participants had experience working in more than one sector of national infrastructure.

Interview schedule

The interview schedule was designed to cover a number of topics related to the perceived ability and willingness of the staff of the participant's organisation to report to work in the event of a serious incident. The first topic included questions designed to explore the interviewees' role in the business continuity planning of their organisation and the types of incidents included in their plans. Then interviewees were presented with a set of questions

specifically related to planning for CBRN incidents and were asked to describe any incidents they had been involved in that could inform future planning for these, e.g. accidental chemical incidents or infectious disease outbreaks/pandemics. The purpose of these questions was to ascertain the particular approach to BCM used by the organisations and their reasons for focusing on some scenarios over others.

The interviewees were also asked to think about the likely behaviour of the staff at their organisation during serious incidents as well as any barriers the employees might face, and any strategies the organisation had in place to encourage their staff back to work. These questions were designed in order to find out if the interviewees were making assumptions about the likely behavioural responses of their staff and the importance they placed on helping their staff get back to work. Another topic covered was the internal communications between the organisation and their staff during an incident, including their use of social media. This topic was included in order to ascertain if organisations were basing their communication strategy on assumptions or evidence about effective risk communication. Topics were not always covered in the same order nor did they have the same weighting within the interviews due to variations in experience. The interviews were semi-structured (meaning the interview schedule was only loosely followed) and participants were allowed to discuss issues related to their own particular background. The full interview schedule is presented in Appendix B.

Analysis

All interviews were audio-recorded, transcribed and subsequently analysed using thematic analysis, a flexible research tool which can be used to provide a rich, detailed account of the data.[448] Through thematic analysis researchers are able to identify and report patterns in the data, also known as 'themes'. The first stage of the analysis involved reading and re-reading of the interview transcripts. Following this, the transcripts were coded, a process where important moments or patterns in the data are recognised and categorised. For this analysis all coding was conducted manually by highlighting text and writing notes in the margins of the printed transcripts. The final stage of the analysis involved collating the codes and considering how these could be combined to form over-arching themes and sub-themes.[449]

[448] Virginia Braun and Victoria Clarke, 'Using Thematic Analysis in Psychology', *Qualitative Research in Psychology* 3, no. 2 (2006): 77–101.
[449] Ibid.

Results

The analysis of the interview transcripts revealed five over-arching themes and each of these had several sub-themes, all of which are described in this section. The themes and sub-themes are presented in Table 3.1.

Table 3.1 Themes and sub-themes arising from semi-structured interviews with resilience professionals (n=21)

Themes	Sub-Themes
1) Business Continuity Management (BCM) approach	*1.1 Planning preferences*
	1.2 Staff awareness/involvement in BC planning/exercises
	1.3 The importance of being part of national infrastructure
2) Perceptions of likely employee responses during an incident	*2.1 It does not matter why staff are not available*
	2.2 Consideration of the issue of staff willingness
	2.3 Assuming staff will come to work
	2.4 Consideration that staff will not come to work
	2.5 Different staff will have different reactions
	2.6 Experience of issues with staff willingness
3) The barriers staff might face when considering reporting to work	*3.1 Fear or concern for self*
	3.2 Fear or concern for others
	3.3 The need to care for others
	3.4 Transport
	3.5 Role
	3.6 Technology
4) Facilitating factors or organisational interventions to encourage staff to return to work	*4.1 Flexible working arrangements and technology*
	4.2 Medical treatment
	4.3 Social/psychological interventions
	4.4 Other organisational interventions
5) Information and communication	*5.1 Methods of communicating with staff during a serious incident*
	5.2 What information staff would want to know in the event of a serious incident
	5.3 Challenges of communicating with staff during an incident
	5.4 Preferred communicators

Theme 1: Business Continuity Management (BCM) approach

1.1 Planning preferences:

A minority of interviewees suggested that their organisations planned for incidents on the basis of past experience. This was either past experiences of the organisation responding to

incidents, individual managers' experiences of being involved in incidents or simply witnessing incidents that affected similar organisations. Five interviewees mentioned that they had focused on bad weather in their exercises as this has been the main source of disruption for them in recent years. One interviewee described the industry as 'event driven', meaning organisations are more likely to plan for incidents that have occurred in the past, and another discussed how affected organisations can be when a similar organisation experiences an incident:

> *I've seen that certainly in organisations where an organisation will get very worried about a certain risk because somebody next door had the same risk manifest itself, and they look like us, and they feel like us, and that could happen to me, therefore my perception of that risk changes and I'm going to do something about it.* [Interviewee 1]

There was also a suggestion that the incidents experienced or witnessed by management in the past, or the ones they are most worried about happening in the future, influences the incidents that organisations plan for. For example one business continuity manager said:

> *….we hold an annual exercise for the executive and the last three of them have been around nuclear events, because our Chief Executive, that's the thing that keeps him awake at night most.* [Interviewee 6]

None of the organisations involved in the interview study had been involved in a large-scale CBRN incident in the past. However, a minority mentioned the Fukushima response and the Litvinenko polonium-210 poisoning. Others drew comparisons from their involvement in small scale hazmat incidents and the influenza pandemics of recent years. Opinions regarding the need to plan for CBRN incidents were mixed among the interviewees. A minority of interviewees said their organisations had planned for CBRN incidents, either in the form of scenario plans or in exercises. One local government business continuity manager described the importance of planning for CBRN:

> *For us it's a key piece of work. What better way to bring the country down…We know it features highly around the National Risk Register, and London will always be under threat.* [Interviewee 7]

Other interviewees said that they did not focus on planning for CBRN incidents because it was too far down the risk register or because a large scale CBRN incident had not happened before in the UK. However, one interviewee acknowledged that if a CBRN incident were to occur in the UK it would change people's perceptions in terms of planning. Two interviewees said that they needed to do more CBRN planning in the future. Others argued that CBRN incidents are very serious and very frightening, which keeps people from planning for them:

> *Some things that people are preparing for they don't want to think about. So some of CBR could be quite contained, but people don't want to think about it.* [Interviewee 18]

Another interviewee also acknowledged the fear that surrounds CBRN incidents with long-term consequences:

> *....there are things that are almost beyond comprehension, so people...they are so severe, so unpleasant, that people do not want to think about it.* [Interviewee 4]

A number of organisations who said they had planned for CBRN incidents had often only considered the incidents that would directly affect their organisation, for example a deliberate attack on their transport infrastructure, or contamination of their water supply or an incident that directly affected their organisation's building. They were often only thinking about these incidents in terms of denial of access events. One interviewee said the organisation they worked for did not plan for CBRN because of the assumption that it would be so serious it would mean simply no access to the workplace. Many had not considered more widespread CBRN incidents such as deliberate infectious disease releases and said they would use their influenza pandemic plan in the case of a more widespread bioterrorism incident. There was also a related assumption that a CBRN incident would only affect operational staff and not office staff. One interviewee admitted to not considering the type of CBRN incident that could potentially go on for a long period of time or where the effects are not known immediately:

> *….I haven't perhaps considered something that could, say like an aerosol, spread some bacteria or something, and you don't know because you might think it's somebody who is slightly disturbed spraying some deodorant or hairspray around. But what you don't know is that it actually contains something harmful. And you might not know until days or weeks later after the incubation period.* [Interviewee 15]

The majority of resilience professionals interviewed expressed a preference for impact-based planning, where the emphasis of the planning is on the effect of the incident on certain aspects of business rather than the cause (e.g. loss of access to buildings/IT/staff etc.). This can be contrasted with scenario planning, in which plans are developed around specific scenarios (e.g. fire, power outage). This preference was especially evident for organisations in the private sector, although not exclusively. There was a general consensus amongst those interviewees who expressed a preference for impact-based planning that organisations should plan for the effect rather than the cause of disruption. One business continuity manager from a financial organisation, when asked if they plan for what has caused the disruption answered:

> *No. Don't care. It doesn't interest us. It doesn't matter. It's the impact of what happens that matters.* [Interviewee 2]

In spite of this, the majority of organisations had a pandemic plan and used scenarios in exercises and for incident response plans.

1.2 Staff awareness/involvement in BC planning/exercises:

The majority of interviewees said they did not include all levels of staff in exercises and that they mostly exercise at a managerial level. The reasons given for this were that there was a concern that some people could take the exercises as real or leak things to the outside world, that resources did not allow it and that it was difficult to exercise everyone because of critical workers' shift patterns:

> *We can't bring everyone in on the exercises because we are quite tight on resources; we know on a day-to-day basis how many people we need, and we don't have much slack in the system.* [Interviewee 9]

One business continuity manager mentioned that they would like to exercise everyone if they could. However, in contrast, another said that there were too many people in the organisation and that the people need to be removed from the planning. Just two of the interviewees mentioned holding staff awareness events (a seminar and a discussion group) related to business continuity. One interviewee discussed the idea that they needed to involve staff more:

> *We're looking to involve our staff more in the plans and the processes we've got. Because we've been very good at doing the work, but we've been very poor at sharing that information with anybody.* [Interviewee 9]

Some organisations had included all levels of staff in exercises, one exercised 50% of the organisations' staff (although this was a very small organisation) and one mentioned an aim to include every member of staff in at least one exercise. This latter idea had come from the interviewee's experience during 9/11 in which they learnt that all staff needed to know what the response plan was to make them feel comfortable that someone was dealing with the crisis:

> *I believe so much in the importance of exercising that I exercise everybody in the organisation, from the tea lady in Hong Kong up to the CEO. I give everyone the opportunity to participate in exercises and I do that every year.* [Interviewee 5]

This interviewee also spoke of including all levels of staff in exercises and described a past white powder exercise which staff found very useful; some did not know what to do in the specific emergency situation beforehand, so the exercise increased their levels of knowledge.

One business continuity manager said that they like to bring the human element into exercises; for example they sometimes include a member of staff dying in the exercise so that there are then issues related to family, next of kin and concerned colleagues that need to be discussed. The same interviewee also mentioned the inclusion of staff concerns about job security and getting the exercise participants to consider how they would deal with that issue. Only three interviewees stated that they had actually asked staff about the potential concerns and issues they might have during an incident and one of these ran employee awareness seminars during which staff were asked to imagine a terrorist incident and then were asked about their immediate concerns. One interviewee explained:

> *We've had one or two exercises and discussions in teams where I've gone round to teams to talk to them about the things they might have to do, and you pick up comments where some people say 'well in a situation like that my family would come first and I would be at home'.* [Interviewee 1]

A number of organisations acknowledged that they did not bring staff concerns (e.g. experiences of fear or practical issues) into their planning processes or their exercises nor did they include staff in the exercises. One interviewee explained that this is difficult to do in large organisations:

> *We don't go down to the staff level…It's difficult with [identifiable number] thousand people, and they will all have an individual view, so at some point you've got to write, I know it sounds callous, but you've got to write some of that off, and just protect them using the best advice you have.* [Interviewee 2]

One resilience professional working for an organisation in the transport sector mentioned that rather than being involved in hypothetical incidents in exercises, the staff had experience of being involved in real incidents.

1.3 The importance of being part of national infrastructure:

The fact that the organisations operate within sectors of national infrastructure and the issues related to this status were brought up by a number of interviewees. One interviewee explained how vital it was for the organisation to continue to function during a serious incident:

> *[We try] to continue to provide support to the customers who need it. Because they do need it. Because other [services] can fail during these types of incidents, and we can't because we are their last piece of the jigsaw I suppose.* [Interviewee 13]

A second interviewee suggested that for national infrastructure organisations there is a lot of pressure to restore services as soon as possible:

> *….we're always aware that as soon as possible you need to make sure that services are restored or, if at all possible, never ceased.* [Interviewee 10]

Another mentioned how there would be serious implications if some services did not continue:

> *….if that service was impacted it could be a life or death situation for the person at the other end, so that's a high priority service.* [Interviewee 11]

A related topic was concern that many of the interviewees' organisations were reliant on other areas of national infrastructure and that some of these suppliers were sole suppliers, for example their telecommunications network. Only one interviewee mentioned communicating to staff that they were working on critical national infrastructure, although this was limited to their operational staff:

> *Yeah I'm always telling the ten guys at the [named site] that we are critical national infrastructure etc. etc., but not telling people in procurement and IT the same.…* [Interviewee 17]

Summary of Theme 1: Business Continuity Management (BCM) Approach:

- Business continuity planning is often event-driven rather than evidence-driven.
- Organisations often prefer to plan for impacts rather than specific scenarios.
- Resilience professionals have different opinions regarding whether or not to plan for CBRN incidents; and if they did, less focus was on incidents with potentially long-term consequences.
- In general interviewees acknowledged the importance of including staff in BCM awareness activities; however the extent to which this happens in practice is somewhat limited.
- Staff concerns are not often included in exercises.
- Being part of national infrastructure was considered an important issue but few resilience professionals communicated to employees that they were part of national infrastructure organisations and why it was important for the country that the organisation continued to function.

Theme 2: Perceptions of likely employee responses during an incident

2.1 It does not matter why staff are not available:

In BCM, one of the impacts considered in impact based planning is loss of staff or staff absence, for example as this interviewee described in relation to a CBRN incident:

> *And it might be that some staff are unavailable for an indeterminate length of time…So the approach is where else can staff work from, and those that can't, ensure that you have succession planning cross-training in place so that other staff can back-fill on any critical priorities that those staff who have been directly impacted are not able to perform.* [Interviewee 15]

When asked if they had considered staff willingness to return to work, the majority of interviewees discussed this idea that they had planned for loss of staff in terms of how to get the absent individuals' work done by others, or how the non-critical work could be put to one side until they come back to work. There was a general assumption among the interviewees who mentioned this approach that the impact would be short-term and staff would come back to work eventually, or that the impact was localised and so more staff could be found from somewhere else, as this interviewee explained:

> *Only the highest priority activities and functions will be carrying on, but the rest will just be by the wayside until they can be picked up again when more staff and resources can be pulled in.* [Interviewee 11]

It is possible for some staff to be able to transfer into other roles, and cross-training was mentioned a few times; although it was acknowledged that although this is easy with lower skilled roles, it is not always possible with highly skilled roles:

> *Through to the other end of the spectrum, where there are a very small number of people who can do [that job]. You know things like foreign exchange traders on a trading floor, and those kinds of things, it's very, very specific and takes a long time to learn to do properly.* [Interviewee 5]

There were also a minority of interviewees who felt quite strongly that it did not matter why staff were not available because the impact will always be the same, for example:

> *....it really doesn't matter if you are unavailable because you can't come to work or you won't come to work; you're not at work, therefore you're not available, therefore we need to deal with you not being here.* [Interviewee 1]

2.2 Consideration of the issue of staff willingness:

When discussing the issues surrounding staff and extreme events, although the interviewees often mentioned potential problems with employees' ability to report to work, very few interviewees brought up the topic of employees not being willing to report to work (unless prompted by the interviewer). This suggests that it is not a front of mind concern for business continuity managers or is simply an issue they have not previously considered. One interviewee acknowledged that this issue was not a priority for business continuity managers:

> *….one of the things that has always struck me as getting parked in the too difficult box [is] the emotional and behavioural response of the people.* [Interviewee 16].

The same interviewee brought up the issue of business continuity managers of national infrastructure organisations (e.g. central government) making 'dangerous' assumptions about willingness:

> *….we make behavioural assumptions because we need people to communicate, drive things, move things etc.* [Interviewee 16]

However, about half the resilience professionals interviewed said they had thought about a situation where staff do not want to come back to work due to fear or other barriers, when specifically asked. Two said they had considered a situation where the fear of catching an infectious disease could affect willingness to report to work and another interviewee discussed staff not returning to work due to fear of radiation. Two interviewees admitted that it would be worth considering issues surrounding staff willingness. Nearly half of the resilience professionals interviewed said they had thought about how staff might react during an incident and what their concerns might be but had never actually asked their staff:

> *No, I haven't really considered it. It's something that I'll perhaps take away after this interview.* [Interviewee 17]

A very small minority of interviewees spoke about which types of incidents they thought staff would be most concerned about, although one suggested it could be incidents involving biological agents whilst admitting that she/he had not thought about it before. Another said that it would be useful to know this information:

> *I've not done any research or asked anybody would they come to work in this scenario versus would they come to work in this scenario. It would be interesting to find out what the answer would be, that would be useful to know what the common picture is. [Interviewee 9]*

As with the issue of willingness in general, not many interviewees mentioned interventions they could use to facilitate willingness, and some said they had never considered this. A few indicated that it did not matter why the staff were not at work, and one interviewee discussed why it was not up to the organisation to facilitate their staff's return to work:

> *….to what extent we should be helping people who are not making a huge effort themselves because they see this as your responsibility, and to what extent should we be, you know, rewarding those who made that massive effort to get themselves in. And at the end of the day we need you to do the job and we have a relationship where you turn up and we pay you, that's kind of the way it works.* [Interviewee 1]

2.3 Assuming staff will come to work:

Half of the resilience professionals interviewed made at least one assumption about their staff being willing to come to work during a serious incident. One of the most common reasons given was employees having a level of personal resilience. It was mentioned that London has a 'Blitz spirit' and that people do not want to admit defeat. Phrases such as 'Dunkirk spirit', 'gung-ho attitude', 'human nature' and 'team spirit' were mentioned. In fact one business continuity manager even acknowledged that they rely on human nature and the human spirit when they plan. Three interviewees gave examples of when staff had volunteered in past incidents. A small minority acknowledged the idea that this may not apply to CBRN incidents, where going to work could put their lives and the lives of their families at risk. Some of the interviewees spoke about how their employees would come to work because of their commitment to the organisation. One even said that they were unable to think of a situation where staff would not be willing to come in, but acknowledged that there was no evidential basis to this:

> *That's nothing grounded in a lot of research or anything, it's a gut reaction that people will respond. It's certainly one of the areas that we will look at in the future.* [Interviewee 20]

A small minority recognised the fact there could also be other influences on the decisions of the staff at their organisations:

> *….there's a high degree of professionalism and commitment. So that would make people want to come back to work, they would feel a duty to do that. But it's whether that is overpowered by their own fear, influence of trade unions, concern by friends, family and alarmist media coverage.* [Interviewee 12]

During the interviews some of the resilience professionals considered the potential factors that could influence an employee's decision to go to work or not. One of the influences considered was an individual's role within the organisation. There was a perception that frontline/operational/critical staff would be more likely to continue to work during an incident. Related to that was the assumption that technical specialists would be more willing to work because they have pride in their work and that people who work on call anyway would expect to work beyond what they are normally expected to do. Another view was that employees of financial organisations whose day-to-day work is tied to the fortunes of the organisation and also to their bonuses, would be more willing to work, whereas employees who know they would get the same amount of pay whether they stay at work or go home would most likely go home rather than put themselves at risk:

> *….they know that if they are not there making money and their bonus, the incentive being money there, Gordon Gekko never went away, they will keep trading while the Wharf burns.* [Interviewee 4]

Furthermore, there was a suggestion by resilience professionals at three organisations that staff need to know the importance of their role in an incident; some people only want to help if they think that what they are doing is useful. They suggested that everyone needs to feel part of the response. One interviewee described the aftermath of 7/7 and how staff who volunteered sometimes felt that their contribution was not valuable because their roles were poorly defined. The same interviewee wondered if willingness to work might be related to how people think the organisation is treating them in general, and thus if morale is related to willingness.

Some resilience professionals believed that specific aspects of their organisation meant that employees would be more willing to go to work than employees at other organisations. One interviewee commented that it was due to the size of the organisation that employees would be willing to go to work:

> *I think the advantage to being small is that if something happens, most people realise it's in their ability to carry on working.* [Interviewee 20]

Another influence discussed was organisational culture. Two interviewees believed that staff at their organisation were loyal and would be willing to work during serious incidents because they identify with the shared values of the organisations, and they are bought into the organisational culture. As one interviewee explained:

> *I think there is a desire to pull together and work in the best interests of the company, and I put that down to a specific cultural change…for the vast*

> *majority that mind-set is there and is there for anything, regardless of what the circumstances might be.* [Interviewee 19]

One interviewee from a transport organisation had a strong belief that their organisation's staff were more resilient than other organisation's staff because of their experience of responding to incidents in the past:

> *The personal resilience of our workforce is a bit higher because of what they've been exposed to, there's a little bit of a head start there.* [Interviewee 12]

The same interviewee also assumed that staff would go back to work as soon as they started to see others going back to work and so would be influenced by colleagues:

> *People tend to think, ok if he's going to work, she's going to work, I'll be part of that, rather than sit at home on my own and do something different. So I think there's some peer pressure...not so much pressure but it's an influence of the wider community.* [Interviewee 12]

Some business continuity managers believed that the business continuity team and those at the top of the organisation should come to work to set an example to the rest. Two interviewees said that they themselves would come to work whatever the incident, because that was their jobs and another with a military background described a mentality in soldiers whereby they put themselves at risk in order to provide for their family:

> *They see it as, 'whatever happens to me, as long as I can provide for them in the future'.* [Interviewee 4]

The same interviewee also described their own level of personal resilience and how they were unsympathetic about people not coming to work because of stress.

Approximately half of the interviewees used previous examples of staff willingness to work to explain their opinions that staff would respond in future incidents. 7/7 was used as an example a few times where people went back to work the next day. Hurricane Sandy, the Buncefield incident and an employee who rowed to work after the Tewkesbury flooding were also mentioned. However, as previously noted, none of these incidents were CBRN incidents. Only one interviewee acknowledged that people's reactions to CBRN incidents could be different to non-CBRN incidents.

2.4 Consideration that staff will not come to work:

In contrast to the interviewees who were convinced their employees would come to work regardless of the situation, there were those who acknowledged that they might not. One

resilience professional mentioned that although people might want to help initially, people have a breaking point where they will say 'no I can't do that anymore'. One resilience professional from a transport organisation fully appreciated that it would be a major challenge getting people back to work and another admitted not knowing what people would do, but that it was possible people might not come to work. As one interviewee questioned:

> *How would people respond to an instruction to go to a particular place if they were not sure about their own personal circumstances?* [Interviewee 16]

A few interviewees mentioned that people could have a conflict between going to work and looking after their families. Two resilience professionals from local government mentioned how they rely on staff to come forward and volunteer in an incident, but acknowledged that they do not have to; you cannot force someone to volunteer if they want to check on their family. One of these interviewees wondered if you should ask staff to consider this possible dilemma before they sign up to become volunteers. The same interviewee recognised the fact that managers may have a different view of their operational staff's willingness in the face of a perceived risk than the operational staff themselves. Similarly, another interviewee said that what an employer would expect staff to do may be different from what they will be able to do or what they will want to do.

Two of the interviewees questioned the assumption in planning that everyone will be available during an incident and that everyone will come to work, for example:

> *You shouldn't assume that everyone will be available. With pandemic you have to plan that you might have casualties and not everyone will be there. I saw a fantastic plan, not our organisation; nowhere in there were they assuming that any of their employees will be affected.* [Interviewee 18]

Interviewees also discussed that the intent to help out during incidents can be different to what a person really would do. One interviewee had an example of a friend who had a role to play in the Cold War:

> *….and what this guy said to me, he said 'yeah I went along with it, went on all the courses, signed all the forms but I was never going to do it. Someone gives me the call, I'm going home'.* [Interviewee 16]

One resilience professional commented that the plan should not even assume the business continuity or resilience manager is going to be there. This particular interviewee was working during an earthquake and suddenly found that his only concern was to drive to the school and see how his son was. Work was no longer a priority, family was:

> *The very first thing we had in mind was how are my kids, where are they? That was another big lesson…Suddenly even for me the plan was secondary. My only concern was to drive there and see how my boy was.* [Interviewee 18]

Another business continuity manager who had previously volunteered to help at 7/7 was not certain that they would do it again due to the stress it caused them. One of the resilience professionals also questioned the assumption that technical staff would come to work regardless of the situation:

> *I think there's a feeling that the mentality in the business is such that they are used to being in emergency teams, that they understand the materials they are dealing with... I think there's a feeling that whatever happened people would be prepared to do whatever. It is an assumption and it's one I always challenge.* [Interviewee 6]

There was also an acknowledgement that the 'in-it-together' spirit that is often mentioned would only last a short period of time as people are running on adrenaline. There could potentially be longer term psychological consequences that could affect staff, particularly if colleagues have been injured or killed.

2.5 Different staff will have different reactions:

Nearly a third of the interviewees discussed the idea that people will react very differently in extreme situations; some employees will make more effort than others, some people will want normality and will want to come back to work, but some will not:

> *There are different mentalities. There will be some people who will not want to come back and we accept that. There will be some people who will go into a flat spin panic about the whole thing. There are some who, because that's where their stress ball is and their screens are set up the way they want, will come back and trade from Canary Wharf regardless.* [Interviewee 4]

One interviewee used the example of the recent pandemic to explain the idea that staff can react very differently to the same incident or the same experiences:

> *And swine flu was an interesting one, but what we saw with swine flu was people being very, very passionate about protection and some of the measures, and others being terribly laissez-faire about it.* [Interviewee 14]

There was a feeling that these different reactions to incidents would have to be managed on an individual basis, as one interview explains:

> *You can't apply a blanket policy. Obviously some people will choose to come to work and some won't and that's down to the individuals, to be managed on a case by case basis.* [Interviewee 9]

The same interviewee also brought up the idea that although some people might react in a positive and committed way in the immediate aftermath of an incident, due to the psychological effect and pressure of the event they may not be able to continue in the longer term:

> *We have good commitment to [non-operational staff being deployed to operational areas] and quite a good buy in. However, that's only going to last a short period of time and then also recognising the fact that the experience that those people have been through, they may be fine to get through on adrenaline and sheer determination for a day or two but then it sinks in and then there's the longer term consequences and impacts of that depending on what has happened.* [Interviewee 9]

The idea of risk was brought up by two of the resilience professionals, with one commenting that risk perception is not always rational or logical and it is not just about calculating the numbers. Another interviewee mentioned the idea that some people want to help in risky situations and may even enjoy it, but some do not (including the interviewee themselves). Even the ones who want to help and say they are fine; there is always the concern that they are hiding how it is affecting them, as the interviewee explains:

> *….we had a core group who were literally waiting to be deployed. I have my own thoughts about the psychology of some of these individuals and I was concerned even for those that showed this hardy approach. I still worried about them, were they hiding their thoughts, was it going to explode at any time?* [Interviewee 7]

One interviewee discussed how people can behave selfishly and it is not always because of fear, but because the situation is not a normal one and so people think the normal rules do not apply.

2.6 Experience of issues with staff willingness:

A quarter of interviewees had experience of someone not coming into work because of fear or concern for their safety. One interviewee mentioned an employee who was 'traumatised' after an incident and would not go back to work:

> *But as a result of [the London bombings] we did actually lose one of our staff who was very traumatised by what they saw at that particular incident…and it was clear that they were never going to come back to the [organisation] in any shape or form.* [Interviewee 7]

Another described the reaction of a staff member who found out a team member had flu and refused to go in:

> *….in the one branch that it happened first, in a 5 person branch, one person refused point blank to come back in at all, until such time as they were told that it wasn't the flu. Other than that they weren't coming in.* [Interviewee 1]

Another spoke about 7/7 and how they had experienced people not wanting to help out, and another had a whole team refuse to do their job because it required them to drive in the snow, even though their job was critical:

> *Another team of people with a different activity but still critically to do with the safety of vulnerable people said, 'no, sorry, we really don't feel confident about driving', and their service had to get other people to fill in for them because they couldn't actually persuade their staff to drive.* [Interviewee 14]

One resilience professional from a transport organisation said they had experienced a very small minority of people say they were not coming into work, and this was blamed on 'media scaremongering' and had also had other staff members asking questions and needing to be reassured:

> *Of course we had a minority of staff ringing up and saying 'I'm not coming to work'. Well why? It was just the Sun saying this. It was probably only two people who rang up and said 'I'm not happy', others asked their managers questions at work and were reassured.* [Interviewee 12]

Summary of Theme 2: Perceptions of likely employee responses during an incident:

- Some national infrastructure organisations have planned for staff absenteeism as a potential impact of an incident, but did not believe it was important to understand why staff were absent.
- The issue of staff willingness to work in the event of different types of incidents did not appear to be a front of mind concern for many of the interviewees involved in this study.
- Beliefs about staff reporting to work during an extreme event such as CBRN incidents were based on conventional wisdom or staff reporting to work in non-CBRN incidents.
- Some interviewees were aware that not all of their staff would report to work during a CBRN type incident.
- Others were aware that different members of staff might react differently to the same incident.
- Nearly a quarter of the resilience professionals interviewed for this study had experienced a staff member not coming to work because of fear or because of the long-term psychological effects of an incident.

Theme 3: The barriers staff may face when considering returning to work

3.1 Fear or concern for self:

A minority of interviewees recognised that in the event of a high-impact, low-probability incident, particularly an infectious disease outbreak or CBRN terrorist attack, staff may be reluctant or refuse to come to work due to a fear for their own personal health/safety. For example:

> *And I think a good example of this is pandemic. If you're running a big operation you might want to ask your people to help you, but then you might also say that all your people might stay at home because they are concerned about being contaminated, and that's a very fair assumption.* [Interviewee 18]

One interviewee acknowledged that staff could potentially stay away due to fear of radiation, but was unsure how this could be dealt with:

> *Because it's radiological, that's automatically scary. And that's an issue where I don't think any organisation, even ourselves, has really got around that question of if you have a widespread absence from work due to a fear factor that you can't really deal with logically.* [Interviewee 1]

Related to this was the idea that staff may be concerned that other colleagues may come to work with symptoms. Using the example of flu, one interviewee acknowledged this could be a problem:

> *….if they see a lot of people going down with flu, they may not want to come in because they're vulnerable or they see that they could get it. One of the problems that we do get is people actually coming into work when they've got flu or ailments that can be transmitted. If you're ill you shouldn't come into work, it's as simple as that.* [Interviewee 13]

One interviewee described the recent swine flu pandemic as the only example of a situation when there was any hint of non-willingness due to health concerns, but that this was dealt with swiftly and effectively with the right channels of communication and the right expertise.

3.2 Fear or concern for others:

As well as fearing for their own safety, staff may feel that coming to work could potentially put their families' lives at risk. This idea was mentioned by two of the interviewees. Similarly, one interviewee mentioned the potential for people to not want to be at work because they are

concerned for their significant others and this was something the interviewee had learned from discussions with staff members:

> *We've had one or two exercises and discussions in teams where I've gone round to teams to talk to them about the things they might have to do, and you pick up comments where some people say 'well in a situation like that my family would come first and I would be at home'.* [Interviewee 14]

Another spoke about the dilemma between continuing to work in an emergency and the need to find out if their family is safe. This dilemma was discussed in the context of the Fukushima nuclear incident:

> *….just put yourself in the place of a guy working in the nuclear power station at Fukushima…he doesn't know if his family's alive or dead, he's on top of a reactor that's going critical…it's the perfect storm in terms of how do you respond to that, as human beings how do you respond to that?* [Interviewee 6]

The interviewee acknowledged the fact that the workers did continue to work and there were examples of tremendous self-sacrifice during and in the aftermath of the incident, but questioned whether that would happen in the UK. A related issue to this is the idea that employees may have to deal with the concerns of their friends and families who might not want them to go to work, as mentioned by one interviewee. Pandemic planning in recent years led to one interviewee realising that there are critical dependencies with regards to staff, in terms of their families being affected, or worrying about their families being affected.

A minority of interviewees brought up the potential conflict staff may face when thinking about whether their first priority was to their families or their job. As one interviewee put it:

> *It's human psychology, some people will want to get involved, some people won't. They just see the job as a job, come in and go home. Some people are going to think 'no, I'll look after myself and my family'.* [Interviewee 11]

Similarly one business continuity manager recognised that the priorities for individuals and businesses may be different during emergency situations.

3.3 The need to care for others:

The need to care for significant others was frequently mentioned in the interviews as a barrier to the ability of staff to report to work. This was often mentioned in relation to family members being ill or schools being closed due to the incident. One interviewee discussed the need to care for others:

> *….you could perhaps have similar domestic impacts e.g. nursing family at home. If schools are shut the kids may not be down with the flu but they are not going to school; who is going to look after them? What about your other dependents who you may need to look after? You might feel well enough yourself to come to work but you have other responsibilities.* [Interviewee 21]

One resilience professional also recognised the significance of schools for UK national infrastructure and that childcare was part of the organisation's supply chain:

> *….as soon as teachers can't teach, well the schools are closed, so therefore people have got to look after their kids, and so people don't go to work and the economy grinds to a halt because you don't have a school.* [Interviewee 4]

However, only one interviewee said that their organisation could provide childcare during an incident but that this was in fact part of their normal day-to-day provision:

> *Yes, so we have places at the nurseries around the area, which are not just for incidents. So if your school is closed for whatever reason you can put your child into some of the nurseries. [Interviewee 2]*

One further interviewee said they had thought about the potential to provide this service in the future. A minority mentioned that it would be up to the manager's discretion in individual cases as to whether an employee could work from home to look after children or if they would have to take a day's leave. Two interviewees said that childcare was not the organisation's responsibility and so people would have to make their own arrangements; some could hopefully rely on other family members to help. For example:

> *The policy is that it is people's responsibility to come to work…Different people have different capabilities, some have got grandparents luckily.* [Interviewee 12]

3.4 Transport:

A few interviewees mentioned that transport disruption could be a potential barrier for employees trying to get to work. However, only two interviewees (and one was from a transport organisation) mentioned the potential concern for their health that staff might have when commuting and how this may affect their willingness to go to work. A resilience professional from a local government organisation highlighted the issue:

> *….if something did happen and you didn't want to use public transport because it's disrupted so you can't, or because it's exposing you to risks you're not comfortable taking then you would be able to continue your key function from a different location.* [Interviewee 8]

Another example related to transport and the issue of willingness to go to work was brought up by another interviewee who discussed the dilemma an employee might have during a fuel crisis when they have limited fuel supply, something which could also happen during a major incident:

> *So the question of 'can I go to work?' remains, but it's affected by the other impacts and the question of 'should I be using my fuel for this or should I be making sure that I can access this, that and the other; are my children home from school and [can I] get them where they need to go, what about other dependent relatives?'* [Interviewee 21]

This example, although not directly related to an extreme event, highlights the potential dilemma an employee might have with regards to going to work or using his/her resources to support significant others.

3.5 Role:

A flexible working environment, with staff working from home, was mentioned by a number of interviewees. However, it was recognised that not all roles are suited to working from home, such as pilots and cabin crew. One interviewee said that the organisation may have to accept that some staff will be at home and not working because their roles do not allow it:

> *You might have to send your lower level staff home, those that are less critical to the immediate delivery, so it might be perhaps that you would ask your admin staff for example to not come into work, and if they can't work from home then you could probably tolerate that.* [Interviewee 15]

However, an issue was raised by a resilience professional from a transport organisation with regards to the message that a decision of that sort might send to staff:

> *I think you have to be careful with this, because if you say to the desk bound people like me that you can work from home during this, it sends the wrong message to the operational staff.* [Interviewee 12]

This presents a challenge for organisations in these situations and the interviewee discussed the possibility that operational staff could feel as though their safety is being taken less seriously than the desk-based staff who are working from home.

There was also a suggestion by one interviewee that staff who are not at the forefront of making the organisation money, the back office workers, would be more likely to go home in these sorts of situations because they know they will get paid anyway.

3.6 Technology:

Although there were many remote access technology options offered by the organisations involved in the research, there were also a few beliefs related to these. Firstly, there was an assumption among some interviewees that everyone has a laptop or computer at home that they could use, and no consideration that there may be couples who both need to work from home but only have one device:

> *….there's an assumption that these days people have the technology. At least they have a home PC, which means they can get their emails via web access.* [Interviewee 15]

Secondly, a number of interviewees were assuming that staff members who were given remote access tokens and/or laptops took these home every night, and, therefore, if an incident happened over the weekend or during the night that people would have everything they needed to be able to work from home the next day. Although some interviewees said they specifically instructed staff to take their remote access technology home, some said they did not tell staff anything:

> *….some people leave their laptops at home and use a desktop computer at work. I take mine home with me just because I do, but I've never been told you have to take it home. Likewise I've never been told don't leave it at home. So it would be entirely dependent on the situation and who had what at the time really.* [Interviewee 9]

There were interviewees who acknowledged that this was a dangerous assumption to make as they were unaware how many employees took their laptops home each day or how many kept their remote access tokens at home. One interviewee recognised that in an incident requiring an evacuation, staff would have to leave their laptops and maybe even their phones in the office, and potentially might not be able to go back in to get them meaning they would be unable to work from home:

> *....staff can [work from home] via laptops, but it depends whether you've taken your laptop home with you. If you can't get into your building then you wouldn't be able to pick up your laptop.* [Interviewee 21]

Another interviewee also commented:

> *It's interesting when you ask people 'where's your laptop?', and we can't mandate that people take their laptop when there's a fire evacuation."* [Interviewee 13]

Even if the employees have all the equipment they need at home, it was also recognised that the servers would need to be able to cope with the increased traffic, and that some staff save

their work on their personal drives (meaning it is not easy for other staff to continue their work in their absence) or on the hard drive of their laptop (that they may have left in the office).

Summary of Theme 3: The barriers staff might face when reporting to work in the event of a serious incident:

- Few resilience professionals acknowledged that staff may not be willing to report to work during an extreme event such as a CBRN incident due to a fear for their personal health or safety.
- Although some interviewees did mention that staff may want to care for their significant others during an incident, only a small minority acknowledged the fact that staff may be unwilling to go to work due to a perceived risk to their families' health as a result of going to work.
- A number of interviewees noted the potential need for parents to care for children when they are ill or because the schools were closed; however there were different views about whether their organisation had a responsibility to help provide this support.
- Transport problems were mentioned most frequently in reference to employees being unable to get to work during a serious incident, but there were fewer acknowledgements that public transport in particular could be a barrier to the willingness of employees to report to work.
- The option of working from home was frequently mentioned by employees, but it was also recognised that not all roles could do this.
- Remote access technology is often provided by organisations. Some interviewees believed that staff take this technology home every evening and others said they did not communicate to staff the need to do this.

Theme 4: Facilitating factors or organisational interventions to encourage staff to return to work

4.1 Flexible working arrangements and technology:

The majority of organisations offered flexible working arrangements, particularly the ability for people to be able to work from home. Some organisations said working from home was allowed when necessary, because of an incident, transport problems or bad weather for example:

> *[Our flexible working policy] allows us to say to people 'well if the transport infrastructure is disrupted or if London is difficult to get to for whatever reason, be it that you have someone at home that you need to look after, or you yourself are not well enough to travel, or you don't want to put yourself in a position where you could be exposed to something on public transport'....* [Interviewee 8]

A minority of organisations said working from home would be allowed when staff needed to look after their children. For example, one interviewee said:

> *For those [children of staff] who are above nursery age, we would, we have allowed staff to work from home and supervise children.* [Interviewee 2]

In addition, one business continuity manager suggested that working from home was allowed when it was easier for people, for example because of appointments or needing to pick children up from school. Finally, two interviewees mentioned that people could work from home if they were worried about the risk of exposing themselves or if they needed to care for a sick family member. For example, one interviewee noted:

> *But if something did happen and you didn't want to use public transport because it's disrupted so you can't or because it's exposing you to risks you're not comfortable taking then you would be able to continue your key function from a different location, mainly from home, but also other offices.* [Interviewee 8]

One resilience professional said that line managers should look into each individual situation, for example if staff needed to care for family. However, another two interviewees acknowledged the fact that different managers think differently regarding working from home during periods of disruption and also set different examples. Many interviewees also brought up the fact that they had alternative locations or back-up offices at which key staff could work if necessary. For example, one interviewee said:

> *So the critical people would decant to their fallback sites, assuming they could get out of here.* [Interviewee 3]

However, the same interviewee did also mention that the organisation's fallback site was within a few miles of the main site.

Only one interviewee mentioned having considered strategies to provide staff with remote access IT equipment such as laptops if they had left them in the office during an incident; spare laptops being kept at alternative sites and the use of disk mirroring to ensure the laptop data is stored separately from the original technology.

4.3 Medical Treatment:

A quarter of organisations had considered a situation where they could provide prophylaxis to their staff in an infectious disease outbreak. Four interviewees said their organisations had either bought or thought about buying prophylaxis in a previous incident. However, issues were raised surrounding the ethics and practicalities of an employer providing medical treatment to its employees. As one interviewee speaking about their former employer explained:

> *So they had essentially purchased, direct from the drug manufacturer, the right to a certain amount of Tamiflu, which could then be prescribed by medical practitioners. That Tamiflu was all held by those drug companies for the four, five or six years before it would be past its use-by-date and then it would be disposed of. Guess what? It all got disposed of. Across all the banks.* [Interviewee 5]

One interviewee discussed potential problems with deciding which staff to provide prophylaxis to if the medication was in short supply. The interviewee questioned whether it should just be provided to critical staff, and if so, how would the rest of the staff feel about that decision? Another admitted that they had not really thought about how to prescribe it or the liability implications involved in doing so:

> *I guess it would have been quite strange; how do you encourage your staff to take it and what sort of liability risk do you take if your staff took antibiotics prescribed by [their employer]…I don't quite know how that will work.* [Interviewee 10]

One interviewee described purchasing iodine for staff in Japan during the Fukushima disaster based on the advice of an independent expert:

> *We also went out and bought all of the recommended items that [name of independent expert] had asked us to buy iodine tablets and stuff like that. So we got all of those shipped in.* [Interviewee 2]

Two organisations specifically mentioned offering flu vaccinations to its staff in recent years. One business continuity manager said that organisations sometimes need to be seen to be doing something in these situations, because staff have heard/seen what competitors are providing or because media coverage is saying what organisations should be doing. It was also noted that staff may be annoyed if they see differing responses at similar organisations, even if the government advice on providing prophylaxis for all new cases has changed and they are no longer advised to do this. Another issue was brought up by another interviewee who mentioned the challenge faced when an organisation has contractors, and whether or not they should also provide interventions for the contractors as well as their own employees.

4.3 Social/psychological interventions:

Five organisations reported having experience of using psychological interventions following an incident, usually in the form of trauma counselling. One interviewee discussed how this was provided to all staff who were involved in a past hoax anthrax incident:

> *Counselling was provided to the people who were exposed throughout the period, saying it probably isn't anything because we do get these all the time, but we need to make sure….* [Interviewee 5]

A minority of interviewees acknowledged the fact that a traumatic incident could have long-term consequences and that staff members could experience symptoms months or years after the event. A few other organisations said that they had the option to use trauma counselling in the future, and one interviewee specifically said this could be used for people who were frightened about going to work. They also said that the trauma counselling would usually be provided by a third party healthcare provider:

> *It's a third party company that we use. If we had an incident, say for 7/7, what we did after 7/7 was to…we notified the company and said 'can you ramp up your staff because we suspect we're going to get more calls', plus we brought some of their counsellors into the building.* [Interviewee 2]

Another interviewee implied that these arrangements were not already in place and that they would be decided on in the aftermath of the incident:

> *….we need to think about whether we engage a firm to come and do post-trauma counselling and get all those arrangements in place.* [Interviewee 6]

One business continuity manager believed very strongly that organisations that are not healthcare providers should not themselves provide healthcare services. Two interviewees discussed the use of pre-incident psychological assessments to assess the suitability of those who could potentially be called on for a role in the incident response, and one of those described an example of a past situation whereby a staff member psychologically affected by an incident had not received adequate support initially, but that they did in the end:

> *I'm not sure to this day whether they got the support that they deserved, possibly because I think they may have tried to hide some of those issues initially…And they did then get the full support of the occupational health, they got the full support of the organisation, and they were eventually retired on an appropriate pension.* [Interviewee 7]

It is unclear from the above example what psychological support the employee was provided by their occupational health department as this was a confidential case.

4.4 Other organisational interventions:

Some other organisational interventions brought up in the interviews were related to hygiene, such as desk cleaning when an employee had been experiencing symptoms, hand gels in communal areas and at building entrances, and advice on effective hand-washing in the toilets. Again, it was mentioned that organisations have to be seen to be doing something because staff may have seen other organisations doing certain things or have heard things in the media:

> *Um there was a lot of feeling that we should be doing more cleaning on the grounds that a lot of media coverage at the time was you touch something that somebody else has touched then that's what causes the problem…And then there's the challenge that some of our competitors gave out hygiene packs to staff, hand cleaners and stuff like that and in some cases put them on desks around, [employees ask] 'they've got that so why haven't I got that?'* [Interviewee 1]

One interviewee considered the idea of quarantining sick staff, making them stay away from the office. Another interviewee said they had discussed the idea of compensation for employees who were prepared to put themselves at additional risk by working during an incident. Another suggested that organisations should 'wave a perk in front of them and they'll come in' and another from a local government organisation spoke about one of the boroughs in which they have rotas for people being ready and available to be called out to an incident, and staff get paid to be on this rota.

A minority of interviewees discussed the potential or their organisation to be able to provide transport options to employees who could not get to work. One interviewee mentioned a contract with a coach company and another said they could organise taxis during an incident:

> *The demands for taxis might be very high but we've got a contract with someone who's designed to do that. We can also call on bus operators to give us capacity in buses and coaches.* [Interviewee 12]

Sometimes this transport assistance could be provided for all staff, but usually just for critical workers. Two organisations would issue advice about how to get to work, e.g. advising people to walk or cycle to lower their risk, or to car-share when public transport was unavailable. However, as with the provision of childcare, a minority of interviewees did not see the provision of transport as something that was the organisation's responsibility.

If employees were unable to get home then three interviewees also mentioned that they could potentially offer accommodation, sometimes in the office and sometimes at local hotels:

> *Hotels round here get filled up, but for our crisis team we would block book hotel rooms, so people essential to the response would be able to get in.* [Interviewee 9]

Two interviewees also described providing assistance with money and clothes if needed, and organising locksmiths to help people get into their houses if they had to evacuate from the office without their house keys. However, one business continuity manager for a public sector organisation brought up the issue of the costs and who would be prepared to cover them for these situations, an issue that needed to be resolved.

Summary of Theme 4: Facilitating factors or organisational interventions to encourage staff to return to work:

- Flexible working arrangements for situations where the usual place of work was inaccessible were frequently mentioned, usually working from home or fall-back sites.
- Several of the organisations involved in the research mentioned providing medical treatment to employees; however there were practical and ethical issues raised by the interviewees.
- Some organisations would provide psychological interventions to employees in the aftermath of an extreme event and this was usually in the form of trauma counselling to all staff involved in an incident, based on the advice of their private healthcare provider.

- Some organisations were able to provide transport, accommodation and childcare. Other interventions mentioned were visible cleaning interventions and financial compensation. There were differing opinions on how much an employer should be helping its employees return to work.

Theme 5: Information and communication

5.1 Methods of communicating with staff during a serious incident:

A wide range of communication methods were mentioned for contacting staff during an incident and overall the communication strategies of the organisations involved in the study were comprehensive and well-tested. The most frequently mentioned communication method was a call cascade or 'phone tree', as one interviewee described the process for a situation where an organisation needed to contact staff at home:

> *For the majority of staff it's almost a cascade ring-round. So the manager will ring team leaders, team leaders will ring their guys, and it works out well.* [Interviewee 17]

The next most frequently mentioned communication methods were an automated phone service or staff hotline and a mass email. However, one resilience professional was concerned that although lots of people have BlackBerry devices, not everyone does so you should not assume emails will get through to everyone. A number of organisations said they would put information for staff on their intranet site and a few spoke about methods whereby staff could register their safety on an automated system or would be instructed to report in by phone, for example:

> *We can also put through the [name of system], which is our external notification system, with both the push system we have, but also a pull system. So we can ask people to register their safety. We don't have to push that out, they can auto register it quickly.* [Interviewee 2]

One interviewee raised a concern that staff might not remember they needed to ring the staff hotline or that they might not know where to find the number, as they explained:

> *There is a staff hotline, but nobody phones the staff hotline. And even people, when you say about the staff hotline, they go 'well where do I find the number?', 'It's on the back of your pass'. People don't you know, because they forget, back to the human memory has a shorter half-life than anything. [Interviewee 4]*

One interviewee also expressed an opinion that automated communication methods should not be used instead of actually speaking to staff; it is important for managers to take responsibility and thus be accountable for making sure staff are safe and looking after their welfare:

> *….we would do a manual call cascade, because our belief was that if you removed the ownership and accountability from line managers, for contacting their people and making sure that A they are alright and B they know what to do.* [Interviewee 19]

One resilience professional said that the organisation would provide a briefing pack for staff and that they would also use texting to send out information. Two organisations mentioned verbally briefing staff or providing a question and answer session, and had done this in the past for incidents.

5.2 What information staff would want to know in the event of a serious incident:

The importance of giving staff information during an incident was mentioned by the majority of interviewees, with one saying that giving staff as much information as possible is important so that they feel empowered, making them less hesitant and more willing. However, only two organisations mentioned any sort of evidence on which to base their approach. One interviewee said that their organisation's communication strategies are informed by the results of their own internal data, specifically related to the method of communication, the likely staff perceptions of the information and believability:

> *It's getting people to see [the public communication], and then depending on the subject it's getting people to believe it as well. It's based totally on research because [the comms team] have their own dedicated research officer.* [Interviewee 11]

However, no other organisations involved in the research mentioned any use of data collection activities in relation to their communication strategy. One other interviewee mentioned discussing risk communication issues with university academics; however, it was unclear if any policies had been developed based on this discussion:

> *I think we had the discussion [about staff concerns during a CBRN incident] when we visited [a university] recently. It's a challenging one, because it links into other work that we have done around welfare and around warning and informing.* [Interviewee 7]

The interview analysis revealed that a number of resilience professionals had thought about the use of pre-event messaging with staff. A few interviewees discussed the usefulness of

informing staff about the organisation's business continuity arrangements, but one interviewee said that it was difficult to do because there is a need to emphasise its importance without scaring people:

> *….so it's how do we continue to raise awareness [of BCM] and how do we keep it at the forefront of people's minds without scaring them really, emphasise its importance and what it means to them and why it's important to them and so on and so forth.* [Interviewee 6]

Another interviewee suggested that staff being aware of the planning means they would be more willing to go along with what they are being asked to do when the time comes. However, this did not appear to have any evidential basis. In the event of a serious incident, some interviewees discussed the importance of telling staff that the organisation is responding and what the strategy for this is. One resilience professional described doing that in a past incident and how it is also a regular part of their communication strategy:

> *[During a flu pandemic] internally we told employees what we had in place, we assured them that we had plans in place. Every winter for example we encourage people who are maybe members of vulnerable groups to have their flu injections. We remind people to check their cars to make sure they've got all the stuff they need for the winter.* [Interviewee 6]

Similarly, another interviewee also said that the initial communication after an incident would be about the organisation's response and another said that the communication would be about what the problem was and the response that was being undertaken.

With regards to the type of information staff would want to receive, many interviewees said staff would want scientific or technical information which the organisation would look to get from external experts. One interviewee from a health organisation was the only one who specifically mentioned the health content of the information, saying that this would need to include symptoms to look out for, mitigation and protective measures and what to do with regards to treatment. However, this interviewee did also point out that this was more their incident response communication than their business continuity communication. One interviewee from a transport organisation said they were starting to think more about staff communications in an incident and expectations of staff during a CBRN incident specifically:

> *As a wider piece we're looking at staff information and engagement across all the contingency continuity plans, the major events we could have and making sure that our staff know what's expected of them and what to do, and that's every member of staff.* [Interviewee 9]

Similarly, when talking about the organisation's expectations of staff reporting to work, one interviewee from a financial organisation said:

> *So I think as long as you're clear, as long as the organisation's clear about what the expectation is and what the requirement is then that works.* [Interviewee 1]

One business continuity manager from a transport organisation noted that staff would want specific reasons and evidence if their organisation was telling them it was safe to come to work, because they may need these to convince their concerned friends and family.

The need to provide reassurance in communications was mentioned by the majority of interviewees and a number said they had had to reassure staff in the past of safety issues. A few mentioned using statistics and scientific information to reassure staff and there was an assumption with one interviewee that if you give this to staff in a CBRN incident that people will go to work:

> *And my view would be, and I'm not a scientific expert, that those who are expert in their field, both with monitoring for chemicals or radiological, nuclear type contamination, they would provide the assurance that there's no risk associated with whatever, and that the science would back that up. And I think on that basis, why would staff then refuse to go to a particular location to work?* [Interviewee 15]

One business continuity manager suggested that if you give people the facts about the CBRN incident it will make it less frightening. When talking about people being afraid of cyanide the interviewee said:

> *And the potential for cyanide attacks, and that's genuinely horrible, and you read the first bit and it says death within 5 to 15 minutes, but then you read on and you find out you've actually got to get it in this level of concentration for it to kill you…as long as you receive medical treatment within a reasonable timeframe you're probably going to be alright.* [Interviewee 4]

Another interviewee said that it is the unknown that is the most frightening; people assume the worst. If you give people the correct information it can mitigate against this.

One business continuity manager admitted having not thought about the need to reassure staff as the organisation has never needed to do that in the past. Of the organisations who had needed to reassure staff in a past incident, in addition to using communication, a couple of interviewees said they did this by physically sending the managers and sometimes the CEO out to workplaces to show employees that the management themselves believed it is safe enough to be there in person.

5.3 Challenges of communicating with staff during a serious incident:

Resilience professionals foresee a number of challenges in communicating with staff in the event of a serious incident. One interviewee spoke about the need for communication to take into account, for example, the employees, the families, the next-of-kin (if there have been casualties), the issues related to colleagues being impacted and job security concerns. Another of the challenges some resilience professionals said they would face during an infectious disease incident is how much they should tell staff about their colleagues being affected. They wondered if they should tell all staff if there had been a confirmed case in the organisation or a suspected case, or if they should only tell staff who work in the immediate vicinity of the affected individual. A minority also queried what would happen with regards to differing policies for contractors, as one interviewee discussed:

> *….again through the grapevine somebody else in the building discovers, and they work for a different company but they are working for us, discovers that there has been a case in the building and they haven't been told, then that creates a problem because in their company their policy is that everybody in the building is told.* [Interviewee 1]

There was also a concern that employers cannot ask their employees what is wrong with them if they are absent, so unless they choose to disclose this information, you may not know about all the confirmed cases.

One interviewee wondered how much they should tell staff about the incident because if they told them too much it would scare them. Another challenge suggested by one interviewee was how to explain technical aspects so that people understand them, and they spoke about the organisation's experience of this issue:

> *And I think due to Fukushima we've got to the stage of saying you know, the amount of radiation experienced there is the same as the pilot would experience on a long haul flight...You have to get some context that ordinary people can understand and visualise.* [Interviewee 6]

With regards to CBRN, one interviewee was concerned that they were either 'dumbing down' the information or raising the profile too much because they did not understand it themselves. Similarly a resilience professional from a local government organisation admitted that even business continuity managers do not fully understand CBRN, which can be a problem when communicating risks. Another interviewee suggested that managers would need to fully understand the science so that they can communicate it to staff and answer any questions they may have. With regards to pre-event messaging for CBRN, a few interviewees described the need to strike a balance; staff (particularly operational staff) need to know what to do in a

CBRN incident in terms of the response, but they should not be told about CBRN risks every day:

> *We have to strike a balance, we can't remind them about it every day or every week because then they would come to work alarmed. We want them to come to work alert and equipped to deal with it, but to keep it in balance.* [Interviewee 12]

One interviewee suggested that it is important to keep it proportionate to the likelihood of the event happening and another believed that organisations should not highlight the risks too much so that staff are always thinking about them.

During an incident there is a pressure to provide accurate information to staff in a timely manner. This was considered by some interviewees to be a challenge because they themselves may not have all the information they need at that time and could therefore be making decisions based on insufficient information. A few interviewees described how their initial messages would not contain much actual event-specific information, but would simply say that there had been an incident and that the response had been 'stood up'. Similarly, one interviewee said that it was important to get a holding statement out very quickly to say what was happened and that the organisation is finding out more information so to expect further updates.

There was also an awareness that organisations need to be honest. Organisations cannot tell people they will not catch an infectious disease if they come into work, because they cannot possibly guarantee that; all they can say is that they are putting interventions in place to try and protect them. Some other interviewees also acknowledged the need to be honest with staff, particularly with regards to the risks they may face by coming to work to support the response; if there is a risk it should be articulated appropriately. There is also a need to be honest so as not to lose the trust of their employees and it was also noted by one interviewee that they cannot hide anything from the staff because of the staff unions:

> *And I think I would say that we try to be very open and transparent with our staff. We operate in quite a unionised environment, so we can't be anything but that, because if we try to keep things, we would lose the trust of our staff pretty quickly.* [Interviewee 10]

Again, the challenge of needing to reassure staff quickly when you do not have all the facts was brought up. One interviewee had considered the fact that in an incident where there are closures, staff may be very concerned about their jobs and will need reassurance, but again, there is a limit to how much you can say. It was also mentioned by a few interviewees that

media scaremongering could influence staff perceptions of an incident and this can then influence organisational interventions:

> *….there was a lot of feeling that we should do more cleaning on the grounds that a lot of the media coverage at the time was [about] how you touch something that somebody else has touched and that's what causes the problem.* [Interviewee 1]

One interviewee was concerned that if people are told not to travel unless they need to, people will read 'don't come to work', as they are looking for any excuse. Another interviewee was concerned that if there was no organisation-wide message then different managers could give out different messages. Similarly, one interviewee said it was important to make sure the information given to staff was coordinated across all parts of the organisation so that all staff receive the same information; this would need to filter down from the top or be sent as a company-wide email. The issue of being a public-facing organisation was also brought up and there was a perceived need to give staff the same information as they were giving the public. For example, there might be an problem if an organisation is telling the public not to travel unless necessary, but they are telling their own staff it is safe to go to work, or vice versa.

5.4 Preferred communicators:

Another topic of discussion during the interviews was centred on who would communicate with staff during an incident. Interviewees made a number of suggestions concerning who staff would want to hear from and also who staff would and would not trust. The suggestions were either specific people/roles at the organisation or whole organisations (e.g. central government). Consistent with previous themes, when prompted interviewees did not appear to be basing these suggestions on previous research.

The issue of employees not trusting the organisation's advice or the government's advice was brought up by a small number of resilience professionals. When talking about a radiological incident and safe levels of radiation, one business continuity manager said:

> *….you can't say, you know, the experts have said it's safe up to this point, because people don't believe that it's safe, therefore they're not coming in. That's an issue I don't think anybody's got their head round.* [Interviewee 1]

A business continuity manager from an energy organisation acknowledged that people need to trust the information givers and questioned whether people trust the organisation they work for. There were various opinions among the interviewees on this topic: One interviewee

believed that academics are more credible sources of information to staff than an employee of the organisation:

> *….because they were a professor from X university then they were a more credible advocate than [a named staff member] from the organisation or whoever it might be. Because they are seen to have less of a vested interest or [seen to be] more independent anyway. People would trust academics more than they would trust a company.* [Interviewee 6]

Another said that medical professionals were more trusted than the organisation. One interviewee felt that the CEO would be the most trusted and that people do not trust ministers or politicians. Another suggested that trade unions might be trusted more than the organisation to give staff information during an incident so they could put out a joint statement with them. One resilience professional admitted not knowing if staff would want to hear from local government (their employer) or central government. Another said that the CEO or person at the top of an organisation is not always the right person to be giving out the messages (if public speaking is involved), they also need to be a good public speaker and not someone who stumbles over their words. Finally, one interviewee said that different people will trust different sources:

> *I think they'd want to hear from a range of people, because different people will trust different things. Some people will be relatively trusting of a senior manager, some people will look to the establishment, so a politician, some people will be looking for a more scientific approach because they will want to read it, understand it, Google it.* [Interviewee 12]

One of the interviewees said that it was important to understand what would make people believe that the information they are being given about the risk is true. In some interviews the organisations' CEO/MD was mentioned as being the person who would front the campaign, whereas other interviewees mentioned that they would use scientists and academics or the company medical advisor/officer. There was a feeling that titles are important e.g. Chief Medical Officer and one interviewee mentioned the conventional wisdom on which they based their views on the subject:

> *The conventional wisdom that we will always come back to is that people in uniform are trusted more than people not in uniform. And I think the conventional wisdom, and I say conventional wisdom because I don't know the basis on which that sits, is that that would be much more readily accepted at face value than if a shifty character like me wearing a suit popped up in front of the camera.* [Interviewee 16]

Another interviewee said that the best way to send out scientific information (if you are not a scientific/health organisation yourself) is to use the information from Public Health England

with their branding on it (or the equivalent) but to send it out with a cover letter from the organisation.

Summary of Theme 5: Information and communication

- Communication methods for use during an incident were comprehensive; however there were differing opinions about which methods would prove the most effective in getting a message to staff.
- Communicating with employees in the event of a serious incident was seen as important; however, there was little discussion about the specific type of information employees would want to receive and the majority did not base their communication strategy on any evidence or research.
- A number of challenges were acknowledged in communicating with staff during a serious incident; for example, when not all the information is known at the time of the communication.
- Interviewees made assumptions about who the best person to communicate with staff would be and who staff would trust the most; often based on conventional wisdom rather than evidence or research.

Discussion

Analysis of 21 interviews has revealed that business continuity and resilience professionals have a wide range of opinions and beliefs related to likely staff behaviour during an extreme event (particularly those with a CBRN element). These behavioural assumptions were often based on conventional wisdom or generalised from dissimilar previous incidents rather than academic research or information/data from real-world events. Half of the resilience professionals made at least one assumption about their staff being willing to come to work during a serious incident; because of personal resilience, Blitz spirit , Dunkirk spirit, gung-ho attitude, human nature or team spirit. These assumptions were usually based on past experience of staff coming to work in non-CBRN incidents such as after the London bombings on July 7th 2005.

Overall, the issue of staff being unwilling to report to work during a CBRN incident was not something that had been considered by many organisations, and for the interviewees who did

discuss this, it was unclear whether they were simply considering this issue at the time of the interview after being prompted to think about it. The fact that half of the resilience professionals had a positive view about the behaviour of staff, that they would be willing to come to work because of Blitz spirit for example, could be viewed in contrast with the existing literature which has revealed responders often have a negative view of public behaviour, believing that the public would panic during an emergency.[450] However, the present study did reveal that a significant number of resilience professionals held a more negative view that was more akin to the views of responders, believing staff would experience fear and could be 'traumatised' as a result of the incident. With regards to the 'Blitz spirit' assumption, there is evidence that the shared fate caused by major incidents can lead to sense of collective unity.[451] However, whether this would apply to CBRN incidents and whether this directly affects an individual's willingness to report to work once the initial danger has passed, is something that requires further investigation.

There were differing views on whether organisations should plan for CBRN incidents, related to the perceived likelihood of this type of incident occurring and the perceived severity of the consequences if one did occur. Some organisations acknowledged that they did not include CBRN incidents very often in their exercises or planning. This is an important finding as previous research has revealed that absenteeism rates are likely to be higher for CBRN type incidents than for other incidents.[452] [453] Furthermore, risk perception research has found that less familiar, more complex incidents such as CBRN incidents are potentially more fear-inducing than natural disasters or explosions.[454] [455] However, rather than utilising evidence from academic literature, the types of incidents organisations plan for are influenced by other factors, such as their own risk register, the culture they operate in, the incidents they have experienced in the past and the ones their management team are worried about. It is vitally important that organisations plan for incidents that involve a CBRN hazard due to the potential decrease in staff willingness that could occur in this type of event.

[450] Pearce et al., 'CIE Toolkit WP8: Risk and Crisis Communication Requirements Following a Chemical Incident or Emergency. Unpublished Report to the European Commission'.
[451] Drury, Chris Cocking, and Steve Reicher, 'The Nature of Collective Resilience: Survivor Reactions to the 2005 London Bombings'.
[452] Qureshi et al., 'Health Care Workers' Ability'.
[453] DiMaggio et al., 'The Willingness of U.S. Emergency Medical Technicians'.
[454] Smith, Burkle Jr., and Archer, 'Fear, Familiarity, and the Perception of Risk: A Quantitative Analysis of Disaster-Specific Concerns of Paramedics'.
[455] Rogers et al., 'Mediating the Social and Psychological Impacts of Terrorist Attacks'.

The interview study presented in this chapter has revealed that the majority of national infrastructure organisations do not appear to exercise all levels of staff, either because of the size of the organisation, resources, shift patterns or security issues. Very few interviewees recognised the importance of these activities; an outcome that is unique to this study. Only a minority of organisations said they had exercised all levels of staff or wanted to include more staff in exercises in the future. Very few interviewees acknowledged the importance of staff being aware of the business continuity arrangements of the organisation. In contrast, Lesperance and Miller found that several public health and hospital officials believed that training employees on how their hospital would function during a disaster was important, and as such the authors recommend that healthcare organisations should ensure that all employees understand how different aspects of the business continuity plan affect them.[456] It is interesting that only a minority of interviewees in the present study mentioned sharing the organisation's business continuity arrangements with staff, perhaps undervaluing the importance of doing this. In a study by Basta, Edwards and Schulte, it was found that public health department employees who had read either the state or county pandemic influenza plan were significantly more likely to report a willingness to respond during an influenza pandemic when face-to-face duties were required.[457] Therefore organisations should consider sharing more of their planning with staff, perhaps as part of their regular training schedule, so that staff understand their role in the organisation's response if an incident were to occur.

The systematic literature review in Chapter 2 revealed numerous potential barriers and facilitators that could influence employees in their decisions about whether or not to go to work during the event of a serious incident.[458] [459] The present study also found that most organisations represented in the interviews did not bring likely staff behaviour or concerns into their exercises. Although some said they did include staff responses, only a minority said they had actually asked staff what their concerns would be during an incident and the rest appeared to be making assumptions about any barriers staff may face. It is vital that employers make an effort to find out what concerns their staff might have and develop strategies that aim to alleviate some of these concerns. It is also important to take into account potential staff concerns when creating business continuity plans or designing risk communication, and

[456] Lesperance and Miller, 'Preventing Absenteeism and Promoting Resilience Among Health Care Workers in Biological Emergencies'.
[457] Basta, Edwards, and Schulte, 'Assessing Public Health Department Employees' Willingness'.
[458] Ogedegbe et al., 'Health Care Workers and Disaster Preparedness'.
[459] Gershon et al., 'Factors Associated with the Ability and Willingness of Essential Workers'.

including staff of different levels of an organisation in exercises could be a useful way of doing this.

A lack of staff willingness to work during high-impact, low-probability events did not appear to be a front of mind concern for resilience professionals, a finding that is unique to the present research. The idea of facilitating employees' return to work was not mentioned by many organisations, unless specifically related to transport. This is an issue that needs more consideration by organisations, not simply to discuss situations where staff may be unwilling to go to work, but also to prepare strategies that could assist employees in overcoming potential barriers or motivate employees to return to work. A minority of interviewees mentioned strategies to assist staff during an incident, such as providing help with transport if the transport network went down or providing accommodation if they were unable to get home. However, the focus was on helping people's ability rather than addressing any willingness concerns. For example, the provision of accommodation was suggested for situations when staff could not get home, not for when staff would rather stay in a hotel than go home, either because they do not want to travel any further than necessary or they do not want to put their families' health at risk. It has previously been suggested that providing temporary accommodation (such as a bed at the hospital or a designated hotel) for employees actively taking care of SARS patients might have helped alleviate their concerns about transmitting the disease to their families.[460]

The idea of staff not being willing to return to work because of fear for their personal health or safety was mentioned by a few interviewees, particularly in relation to an infectious disease outbreak during which employees could be concerned that their colleagues were contagious. A few interviewees mentioned the concerns employees may have for their families or significant others and acknowledged that this may stop people reporting to work. Previous research has provided support for this view. For example, Gershon et al. reported that the most common barrier to US home healthcare workers' willingness to work was fear for self and family's safety.[461] Furthermore, in a study by Lesperance and Miller several interviewees revealed that the risk of infecting their children was a major concern of healthcare workers during SARS.[462] In light of these findings, this study is the first to reveal that resilience professionals in several sectors of national infrastructure are aware that staff may not be willing to return to work

[460] Lesperance and Miller, 'Preventing Absenteeism and Promoting Resilience Among Health Care Workers in Biological Emergencies'.
[461] Gershon et al., 'Pandemic-Related Ability'.
[462] Lesperance and Miller, 'Preventing Absenteeism and Promoting Resilience Among Health Care Workers in Biological Emergencies'.

because of fear for their personal health or safety. However, fewer interviewees acknowledged that employees might be concerned that their decision to go to work during an infectious disease outbreak could put their family at risk if they catch something and then pass it on. Therefore, as previously mentioned, providing accommodation to staff during an incident may be a way of encouraging them to come to work.

The need for individuals to care for others during an incident was considered by a few interviewees; however there was a difference of opinion with regards whose responsibility it would be, the organisation's or the individual's. Previous academic research with healthcare workers has revealed that the need to care for others is a frequently selected barrier to healthcare workers' willingness to report to work during a serious incident. For example, Qureshi et al.'s findings showed that having childcare obligations was correlated with healthcare workers being less willing to work in a number of catastrophic events.[463] However, it is unclear if this may also be related to the feelings of guilt a parent may have leaving their child to go to work during a serious incident and the potential 'role conflict' the parent may feel in this situation. Killian's theory of role conflict suggests that people may feel a conflict when they are members of different groups, and that the biggest conflict is between the family and other groups (see Chapter 1 for a more detailed discussion of this theory).[464]

The suggestion of a conflict between an individual's role at work and their role in their family was brought up by a small number of interviewees, including one who had experienced this conflict himself during a real incident. This is the first research study to find evidence that resilience professionals may be aware of the potential for staff (other than healthcare workers) to experience role conflict during serious incidents; however many either did not see this as a potential issue related to staff absenteeism or thought it was one they could not do anything about. The fact that some resilience professionals did not appear to consider employees' childcare as their responsibility and some did not wish to help staff with this problem, is an issue that needs revisiting in light of this study and the previous academic research. Allowing staff to work from home when they have a sick family member to look after or a child who cannot go to school because the schools are closed is something that could benefit not only the individual employee but also the organisation as a whole; an employee who is sitting at their desk worrying about his/her family is unlikely to be a productive member of the workforce.

[463] Qureshi et al., 'Health Care Workers' Ability'.
[464] Killian, 'The Significance of Multiple-Group Membership in Disaster'.

Although many organisations recognised the fact that transport could be a barrier in people's ability to get to work and had thought about offering assistance in these circumstances, only a minority of interviewees mentioned that individuals might not be willing to use public transport even if it was functioning normally. This is important as an infectious disease outbreak could cause employees to become concerned about the threat of infection by travelling on public transport, an issue that is explored further in the findings of the focus group study in Chapter 5.

Some interviewees recognised that not all roles are suited to working from home and also that a person's role might affect their ability and willingness to come to work in an extreme event. However, the majority of interviewees did not mention the importance of staff being aware of the role they would have in their organisations' response to an incident. Similarly, only one interviewee said they told employees they were working on critical national infrastructure. Academic research in this area has revealed that perceived importance of role is a significant predictor of the willingness of healthcare workers to report to work during a serious incident. For example, Balicer et al. in their 2010 study concluded that the most influential factor associated with willingness to work for local public health workers during an influenza pandemic was the perception of the importance of one's role in the agency's overall response.[465] Similarly, Goodhue et al. reported that the most significant factor predicting the willingness of paediatric nurse practitioners to respond was having a specified role in the workplace disaster plan.[466] Therefore, it is recommended that organisations take steps to ensure all employees are aware of the importance of their role in their organisation's overall response and recovery in the aftermath of an extreme event.

The present study revealed that a number of assumptions are being made by organisations with regards to the use of technology during a period of disruption. For example, when discussing remote access technology, it was assumed by many interviewees that staff take their laptops and remote access tokens home at the end of every day; and only a small number of interviewees considered a situation where they had not taken these home or had been forced to leave them at work due to an evacuation. Furthermore, few interviewees said that their organisations communicated to staff the importance of taking remote access technology home at the end of each day. These are issues not raised in the previous research with healthcare workers, most likely due to the fact that the majority of healthcare workers would be needed to report to their normal place of work during a serious incident and not to work

[465] Balicer et al., 'Local Public Health Workers' Perceptions'.
[466] Goodhue et al., 'Willingness to Respond in a Disaster'.

from home, and as such is a unique contribution to the academic literature. This issue is potentially more important for other sectors of national infrastructure such as finance or communications, where certain roles could potentially be continued from home if employees have the necessary equipment. Several interviewees mentioned having alternative sites or back- up offices that staff could use if their normal location was not accessible. However, it is important to note that no interviewees mentioned that staff may not be willing to travel to another location, due to issues such as the distance to the alternative site or the perceived risk of travelling a longer distance on public transport to get there. This issue of remote working is revisited in the employee data collection reported in Chapters 4 and 5.

The analysis of the interviews revealed that there were differing opinions on whether to provide employees with medical treatment and the capability to do this varied from organisation to organisation, most likely to do with the costs and moral concerns. Some organisations had previously purchased medical supplies such as Tamiflu and had not actually distributed this amongst staff, with the exception of the flu vaccination. The results of the systematic literature review in Chapter 2 revealed the provision of medical treatment to healthcare workers and their families as something that could increase their willingness to report to work during a serious incident. For example, Syrett et al. reported that healthcare workers were most likely to respond in the event of an infectious disease outbreak when an effective treatment was offered on site to both the employees themselves and their families.[467] The fact that the resilience professionals in the present study did not mention any plans to provide medical treatment to employees' families potentially shows a gap in knowledge regarding the effect this provision could have on staff willingness to report to work. In light of this, it is recommended that business continuity managers and emergency planners are trained on the importance of providing medication to the families of essential workers specifically; and the business continuity managers and emergency planners should look to include this intervention in their plans for scenarios in which it is feasible and advisable to provide medication.

Although many organisations mentioned the ability to provide psychological interventions in the aftermath of an incident, there was no discussion about the relative merits of different types of interventions (with no mention of any social interventions). Most said they would be advised by a third party organisation (usually their private healthcare provider) which type of psychological intervention to use, which was usually a form of 'trauma counselling'. The vast

[467] Syrett et al., 'Will Emergency Health Care Providers Respond to Mass Casualty Incidents?'.

majority of business resilience professionals did not seem to have considered the use of psychological or social interventions with regards to facilitating willingness to return to work. In recent years, academics have advised that rolling out blanket 'trauma counselling' or conducting 'single-session psychological debriefing' with non-selected trauma victims does not have any recognised benefit, and could potentially do more harm than good.[22] Providing these kinds of psychological interventions could make individuals believe they should be experiencing psychological symptoms or force them to re-live an incident unnecessarily. Rather than pathologising their feelings as symptoms of a potential psychological disorder, it is important staff understand that it is normal to feel stressed or anxious in the aftermath of a serious incident and at what point they should consider seeking further help. It is recommended that employers focus on providing practical support to employees, as well as facilitating the social cohesion that occurs naturally after events of this type. More discussion around this issue is presented in Chapter 6.

Giving staff information during an incident was mentioned as important by all of the interviewees, particularly the need for frequent accurate updates that provided reassurances about safety. This is similar to the Lesperance and Miller study, which reported that the interviewees stressed the importance of providing frequent, accurate and honest information to healthcare workers during a biological event.[468] Furthermore, the authors suggest that providing consistent and compassionate communication to employees, alongside giving employees the opportunity to provide feedback will help the leadership maintain the trust of their workforce. The importance of providing accurate information to staff during an incident was shown in a study of student nurses by Young and Persell, where it was found that the students' concerns for safety (self and family) were based on inaccurate knowledge about some of the agents concerned.[469]

Using effective risk communication during an extreme event has the potential to increase compliance and influence desired behaviours in the public.[470] For example, in a study by Rogers, Amlôt and Rubin, it was reported that providing appropriate messages to the public about radiological dispersal devices increased the credibility of official advice and increased

[468] Lesperance and Miller, 'Preventing Absenteeism and Promoting Resilience Among Health Care Workers in Biological Emergencies'.
[469] Young and Persell, 'Biological, Chemical, and Nuclear Terrorism Readiness'.
[470] Rogers and Pearce, 'Risk Communication, Risk Perception and Behavior'.

levels of intended compliance.[471] In the case of a serious incident, such as one involving a CBRN hazard, effective risk communication from an employer has the potential to inform and prepare its staff, which in an emergency could mean people know what to do to protect themselves and thus result in fewer fatalities.[472] It also has the potential to promote desired behaviours such as employees being willing to report to work. Adding to the discussion, Becker has suggested that during a CBRN incident people's behaviour could be influenced if they are given clear, scientifically accurate advice.[473] Therefore, the findings of the present study support the previously held view that accurate, scientific information should be provided to the public and to staff during an extreme event in order to increase compliance with recommended actions and promote desired behavioural responses, such as staff being willing to report to work.

Communicating with staff during an incident was perceived to be a challenge by many interviewees. For example, there was concern over how much staff should be told, because they need the information but they do not need to be frightened; especially during a CBRN type event. The interviewees also mentioned that there would be a pressure to provide staff with full information and reassure staff before all the specific details are known; reassurance was mentioned by several resilience professionals. Interestingly, Rogers, Amlôt and Rubin, in a study examining the impact of communication materials on public responses to a radiological dispersal device attack (RDD), found that information that simply provides reassurance may not be enough to improve compliance with preferred behaviours.[474] The authors suggest that the information should aim to increase knowledge, reduce anxiety, manage expectations, build trust, and create familiarity with emergency response procedures. Similarly, Rogers and Pearce noted another potential problem with ineffective risk communication, in that it could lead to under-response.[475] This could be a problem in an infectious disease outbreak if employees do not trust the information they are being provided with about the threat of infection; they may choose not to comply with the health recommendations and could report to work whilst contagious, thus making the situation a lot worse for the organisation.

Pearce et al., in their study of public responses to a hypothetical radiological incident found that because participants believed they would have been quarantined if there was really a risk

[471] M. Brooke Rogers, Richard Amlôt, and G. James Rubin, 'The Impact of Communication Materials on Public Responses to a Radiological Dispersal Device (RDD) Attack', *Biosecurity and Bioterrorism: Biodefense Strategy, Practice, and Science* 11, no. 1 (March 2013): 49–58.
[472] Acton, Rogers, and Zimmerman, 'Beyond the Dirty Bomb'.
[473] Becker, 'Emergency Communication and Information Issues'.
[474] Rogers, Amlôt, and Rubin, 'The Impact of Communication Materials'.
[475] Rogers and Pearce, 'Risk Communication, Risk Perception and Behavior'.

of radiation, they were falsely reassured about the severity of the situation.[476] This assumption caused them to believe it was a 'scare story' and most said they would not alter their behaviour. Therefore it is vital employees are provided with accurate information about the true seriousness of the situation, and not simply reassured, as this could result in unhelpful behaviour or non-compliance with recommended actions.

Who would communicate with staff during an incident varied by organisation and opinions of who staff would trust the most to provide them with reassurance regarding coming to work, varied by interviewee. The majority of interviewees did not base their opinions of who people would trust on any research and usually based these on conventional wisdom or personal beliefs. Research examining public reactions to a terrorist attack involving botulinum toxin found that health or emergency response experts, national leaders and familiar news reporters were considered credible spokespersons during the incident, and that local politicians and elected officials were not specifically mentioned.[477] Wray et al. in their US study found that the public had more confidence in local than federal authorities when being given information regarding an emerging health threat; and that they were more likely to trust first responders than politicians.[478] Another study found that when faced with conflicting expert opinions regarding quarantine during the SARS outbreak in Toronto, physicians were more likely to believe the person they knew better and trusted more.[479] This last finding provides support for the use of the company Chief Medical Officer to deliver the health messages, as mentioned by a few interviewees in the present study.

There were differing opinions regarding the use of social media during an incident. Some organisations said they already used this communication tool and some said they do not, and would not in the future for various reasons. There was often a distrust of the information on social media and various assumptions about how staff would make use of social media during an incident. Interestingly, a previous academic study has shown that the public were more likely to share information they read on an online newspaper than on social media, due to

[476] Pearce et al., 'Communicating with the Public Following Radiological Terrorism'.
[477] Deborah Glik et al., 'Public Perceptions and Risk Communications for Botulism', *Biosecurity and Bioterrorism: Biodefense Strategy, Practice, and Science* 2 (July 2004): 216–23.
[478] Wray et al., 'Communicating with the Public about Emerging Health Threats: Lessons from the Pre-Event Message Development Project'.
[479] Clete DiGiovanni et al., 'Factors Influencing Compliance with Quarantine in Toronto during the 2003 SARS Outbreak', *Biosecurity and Bioterrorism: Biodefense Strategy, Practice, and Science* 2, no. 4 (February 2004): 265–72.

newspapers being perceived as more credible sources of information.[480] In the present study only one organisation mentioned recommending the use of social media during an incident to their staff and advising them on the best ways to use it. Many interviewees had negative views of social media during an incident because of how quickly rumours can spread and the difficulty of controlling or managing it. It is important that organisations learn how to make use of social media, due to the significant numbers of people who now use social media and the fact it is so readily accessible on mobile phones. This study has been the first of its kind to examine business continuity managers' perceptions about the use of social media during an incident and more specifically how employees would be likely to behave on social media. However, further research is needed to examine the effect social media has on public or employee reactions to serious incidents such as CBRN terrorist attacks.

Methodological limitations

One limitation of the present study and of qualitative research in general is the relatively small sample size. However, in the context of the present study, even the opinions of one individual BCM manager can be considered extremely important when that individual is responsible for making decisions that will affect thousands of employees. Even though the results cannot necessarily be generalised to all organisations in the same sector, they are still important as a number of these large organisations (e.g. energy providers or transport organisations) would have a significant role to play in keeping the UK running in the event of a serious incident.

Another limitation of the present study was that the sample was an opportunistic sample and a number of participants were recruited through networking contacts. It is possible that a certain type of professional, perhaps those who are interested in improving the discipline through research or those who are more helpful in nature, would want to be part of a research study. It is therefore possible that the views and experiences of these 21 interviewees are not representative of the general population of business continuity and resilience professionals. Further, there was only one female present in the sample; however this might also be due to an unequal gender distribution in business continuity manager roles.

The semi-structured interviews allowed the participants to discuss their individual past experiences; however it is impossible to verify the accuracy of some these reports. It is also

[480] Sonja Utz, Friederike Schultz, and Sandra Glocka, 'Crisis Communication Online: How Medium, Crisis Type and Emotions Affected Public Reactions in the Fukushima Daiichi Nuclear Disaster', *Public Relations Review* 39, no. 1 (March 2013): 40–46.

unclear whether certain aspects were being underplayed or overemphasised by the interviewees due to them wanting to be perceived to be doing the right thing and considering the needs of their staff. Similarly it was not evident whether interviewees had thought about the issues related to staff willingness prior to the interview or whether they were thinking about these things for the first time during the interview. If the latter is true then potentially the results of the present study have overestimated the extent to which business continuity managers and resilience professionals have planned for their staff being unwilling to work.

Conclusions

The present study has been the first of its kind to conduct semi-structured interviews with business continuity managers and resilience professionals from national infrastructure organisations in the UK to examine expectations and planning for how staff will behave in the aftermath of a serious incident, particularly one with a CBRN hazard.

Overall, the findings have revealed that business continuity planning within the UK national infrastructure is based on many behavioural assumptions and grounded in little or no academic research regarding the likely reactions of employees in the event of a high-impact, low-probability event. Very few organisations have actually asked staff about their likely concerns or the issues they may face in the event of an incident that causes significant disruption. Many assumptions surrounding likely staff behaviour seemed to be based on conventional wisdom, such as 'people like normality' and experiences of staff reporting to work during incidents that were not CBRN. There were also dangerous assumptions by some interviewees that their staff would return to work in any situation that may not be borne out in reality; something that has the potential to put businesses at serious risk in a time when they need to recover.

In summary, the present study has provided a unique addition to the pre-existing research in this area and its findings have been used alongside the systematic literature review (Chapter 2) to inform the next phase of data collection, the employee web survey (Chapter 4). The web survey and the employee focus groups (Chapters 4 and 5) were used to test some of the behavioural assumptions highlighted in this interview study regarding staff willingness to work and the potential barriers and facilitators that could be influencing their decisions. Some suggestions for future research based on the findings of this interview study are presented in Chapter 6.

Chapter 4: Survey Study

Introduction

In the event of incidents that cause serious disruption, organisations need their staff to report to work to facilitate business recovery and return to normal functioning. However, it is unclear to what extent employees from all sectors of national infrastructure would be willing to do this when one considers the practical and psychological barriers they could face. This chapter presents the findings of a web survey study examining the factors that predict the willingness of employees to report to work for a range of hypothetical serious incidents, including CBRN terrorist attacks. The aims of the study were to ascertain:

1. What factors (demographic, psychological and job-related) might influence employees' willingness to go to work in the event of a serious incident.
2. If the perceived willingness and ability of employees to go to work varies by incident type.
3. What barriers and motivating factors play a role in the decisions of employees in the event of a serious incident.

The findings from the literature review and qualitative interviews aided the design of the survey. Specifically, the predictor variables included, for example:

- Organisational identification
- Job satisfaction
- Importance of returning to work during an incident
- Importance of organisation continuing to function
- Perceptions of health and safety
- Risk perception (likelihood and severity)
- Having a business continuity role
- Working climate
- Extended Parallel Process Model (EPPM) (as described in Chapter 1)

Some of these measures have been used in previous research examining the willingness of employees to go to work during extreme events. Others are applied to the topic of extreme events for the first time but have previously been used in organisational psychology research, (e.g. studies of return to work behaviour after sickness/injury or work commitment). See Chapter 1 for the theoretical justification for including these variables in the present research.

Web surveys have already been widely used to examine the willingness of healthcare workers to report to work in the event of a serious incident, or most frequently, during a pandemic.[481] [482] [483] [484] Web-based surveys are particularly useful because, conducted correctly, they can be anonymously completed and allow employees to be honest about their likely behaviour in an emergency. Furthermore, research has found web surveys to be of equal quality to more traditional pen-and-paper methods.[485] In light of this, a web survey was deemed the best way of meeting the objectives of the study.

Method

Survey design and procedure

Prior to the study commencing ethical approval was granted from the KCL War Studies Group Research Ethics Panel (REP(WSG)/11/12-28). The survey was hosted on Select Survey and was live from 02/05/13 to 26/07/13.[486] Prior to the survey going live, the survey was piloted amongst individuals in the author's network and feedback was received. The survey was piloted to ensure questions were clear to respondents and changes were made based on the feedback. The feedback confirmed that in general respondents understood what was meant by the ten different scenarios and if they were unsure about a term they used an internet search engine to find a definition. An email was sent containing a link to the survey and participants were encouraged to forward the email on to others. The rationale for the use of the snowball

[481] Barnett et al., 'Assessment of Local Public Health Workers' Willingness to Respond to Pandemic Influenza'.
[482] Gershon et al., 'Factors Associated with the Ability and Willingness of Essential Workers'.
[483] Stergachis et al., 'Health Care Workers' Ability and Willingness to Report to Work During Public Health Emergencies'.
[484] Irvin et al., 'Survey of Hospital Healthcare Personnel Response during a Potential Avian Influenza Pandemic'.
[485] Samuel D. Gosling et al., 'Should We Trust Web-Based Studies? A Comparative Analysis of Six Preconceptions about Internet Questionnaires', *The American Psychologist* 59, no. 2 (February 2004): 93–104.
[486] Classapps, 'SelectSurvey .NET Survey Software Hosted Service | .NET Survey Software Application for Online Web Surveys', accessed 1 December 2014, https://selectsurvey.net/.

technique to recruit was that it was a convenient way of reaching individuals that the author would not usually have access to. It was hoped that individuals would forward the survey link on to colleagues and others in their networks who were also employed at that time. This was also a method of sampling that did not cost anything to use and was not as labour-intensive as some other sampling methods such as quota sampling. It has been suggested that snowball sampling is not only a useful way to gain access to hard to reach populations, but may also allow individuals be more open with their responses, due to the fact they have received the survey from someone they know and/or trust.[487] [488] The survey took approximately 15 to 25 minutes to complete and participants were informed that their responses were completely confidential and their identities would remain anonymous. They were also informed that they should only fill in the survey if they wanted to, were free to withdraw at any time and that their participation would not affect any aspect of their employment. All items on the survey required a response in order for the participant to proceed to the next page.

Participants

Survey respondents were required to be over the age of 18 and currently employed in the UK at the time of filling in the survey. They could be employed by any type of organisation in any sector. Recruitment took place via emails sent out from gatekeepers at organisations involved in the PhD advisory board and through contacts of the supervisory team and the funding organisation Deloitte. Survey respondents were encouraged to forward the email on to anyone else who might be willing to fill it in. The survey link and description were also placed in the Business Continuity Institute (BCI) newsletter and leaflets were handed out at a KCL War Studies end-of-project workshop attended by a large number of resilience professionals.

Survey content

Behavioural outcome variable:

Participants were asked to indicate their willingness to report to work in the event of a list of 10 serious incidents. Willingness to report to work was described as whether they voluntarily

[487] Abdolreza Shaghaghi, Raj S Bhopal, and Aziz Sheikh, 'Approaches to Recruiting "Hard-To-Reach" Populations into Re-search: A Review of the Literature', *Health Promotion Perspectives* 1, no. 2 (20 December 2011): 86–94.
[488] Shuh-Jen Sheu et al., 'Using Snowball Sampling Method with Nurses to Understand Medication Administration Errors', *Journal of Clinical Nursing* 18, no. 4 (1 February 2009): 559–69.

intended to report to work (as opposed to being physically able to get to work which was a separate variable). They could respond 'Willing', 'Not Willing' or 'Not Sure', as per the primary outcome variable used by Qureshi et al., in their study of the correlates of the ability and willingness of healthcare workers to report to duty during catastrophic disasters.[489]

The list of hypothetical incidents were as follows:

1) Bomb/explosive incident
2) Chemical warfare agent release
3) Accidental chemical spill or leak
4) New strain of pandemic flu
5) Deliberate release of the smallpox virus
6) Dirty bomb
7) Severe flooding
8) Deliberate release of pneumonic plague
9) Severe snow
10) Nuclear incident

The incidents were selected to include a variety of qualitative attributes from risk perception theory such as the risk being controllable or uncontrollable; familiar or unfamiliar; chronic or catastrophic; serious consequences or not serious consequences; and whether it is a common risk or one people have great dread of.[490] For example, severe snow is likely to be perceived as more familiar with less serious consequences than a dirty bomb, and a deliberate release of smallpox is likely to be perceived as more uncontrollable than a conventional bomb/explosive incident. Therefore it is expected that responses will differ for some incidents compared to others due to these qualitative attributes. The final choice of scenarios was informed by a wealth of past research examining public responses to CBRN terrorist attacks and other large public health emergencies.[491] [492] [493] [494] [495] [496] [497]

[489] Qureshi et al., 'Health Care Workers' Ability'.
[490] Fischhoff et al., 'How Safe Is Safe Enough?'.
[491] Acton, Rogers, and Zimmerman, 'Beyond the Dirty Bomb'.
[492] Pearce et al., 'Communicating Public Health Advice After a Chemical Spill'.
[493] Rogers and Pearce, 'Risk Communication, Risk Perception and Behavior'.
[494] Pearce et al., 'Communicating with the Public Following Radiological Terrorism'.
[495] Katherine M. Marshall et al., 'A Population Survey of Smallpox Knowledge, Perceptions, and Healthcare-Seeking Behavior Surrounding the Iraq Invasion-Connecticut 2002-03', *Biosecurity and Bioterrorism: Biodefense Strategy, Practice, and Science* 3, no. 3 (September 2005): 246–55.
[496] Henderson et al., 'Chemical (VX) Terrorist Threat'.

Predictor variables:

A range of predictor variables were included in the survey which fall under a number of thematic subheadings. The predictor variables included in the survey are described here with further explanation where necessary. A full list of survey items can be found in Appendix C.

Organisational Identification:

The measure of organisational identification used in the survey was a modified version of the model used by Mael and Ashforth in their study of alumni at an all-male college in the US.[498] The alumni study was the first time the researchers had operationalised organisational identification, although it had been considered a concept important to organisations for many years.[499] [500] The measure of organisational identification used by Mael and Ashforth was found to be associated with other organisational variables such as: satisfaction with the college; sentimentality towards the college; tenure; ranking of financial contributions to the college; and the willingness to advise others to attend.[501] When the researchers applied the same model to a sample of army recruits, the reported coefficient alpha was 0.74, and they note that it was ≥ 0.8 in previous samples.[502] This indicates the model is reliable and as such was selected for inclusion in this study. As with Mael and Ashforth's model, this survey included six items all using a 5-point Likert scale. However, instead of the 'name of school' or 'this school' the present survey referred to 'the organisation I work for' or 'this organisation', which made it more relevant for employees of other organisations. The six items of the model were: 'When someone criticises the organisation I work for, it feels like a personal insult'; 'I am very interested in what others think about the organisation I work for'; 'When I talk about the organisation I work for, I usually say 'we' rather than 'they''; 'This organisation's successes are my successes'; 'When someone praises the organisation I work for, it feels like a personal compliment'; and 'If a story in the media criticised the organisation I work for, I would feel embarrassed'. A mean score for the 6 items was calculated for each participant.

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[497] G. James Rubin et al., 'Perceptions and Reactions with Regard to Pneumonic Plague', *Emerging Infectious Diseases* 16, no. 1 (January 2010): 120–22.
[498] Mael and Ashforth, 'Alumni and Their Alma Mater'.
[499] Rupert Brown et al., 'Explaining Intergroup Differentiation in an Industrial Organization', *Journal of Occupational Psychology* 59, no. 4 (December 1986): 273–86.
[500] Brown, 'Identification and Some Conditions of Organizational Involvement'.
[501] Mael and Ashforth, 'Alumni and Their Alma Mater'.
[502] Mael and Ashforth, 'Loyal From Day One'.

Job satisfaction:

A measure of job satisfaction was created from a job satisfaction subscale of the Michigan Organizational Assessment Questionnaire (MOAQ).[503] The MOAQ was originally designed for use as an alternative to the Job Diagnostic Survey and includes subscales from the Job Characteristics Model.[504] [505] The full MOAQ scale includes variables related to job characteristics, feelings of responsibility and motivation; however it is only the job satisfaction subscale which has been included in this survey.[506] Bowling and Hammond's meta-analysis revealed the subscale to be a reliable and construct-valid measure of job satisfaction.[507] Due to these results, the measure was selected for inclusion in this survey. The variable included in this study consisted of the mean of two of the subscale items*:* 'All in all I am satisfied with my job' and 'In general, I don't like my job'. The decision was taken not to include the third item 'In general, I like working here' because the use of the term 'here' could relate to the home environment, especially considering the fact that more employees work from home now than they did in the 1970s when the scale was developed. To avoid any ambiguity with this statement it was removed. Participants were required to indicate their level of agreement to the two statements on 7-point Likert scales.

Roles and responsibilities:

Perceived importance of role was measured using participants' responses to the statement: 'If I can continue to work in the event of a serious incident it will make a big difference to the organisation I work for'. Participants were required to indicate their level of agreement on a 9-point Likert scale. Similarly, participants were asked to identify their level of agreement with the following statement: 'If my organisation can continue to function in the event of a serious incident it will make a big difference to keeping the country running'. This latter statement was designed to measure the extent to which participants believed their organisation played an important role in the UK's national infrastructure.

[503] Bowling and Hammond, 'A Meta-Analytic Examination'.
[504] Ibid.
[505] J. Richard Hackman and Greg R. Oldham, 'Motivation through the Design of Work: Test of a Theory', *Organizational Behavior and Human Performance* 16, no. 2 (August 1976): 250–79.
[506] Bowling and Hammond, 'A Meta-Analytic Examination'.
[507] Ibid.

Health and safety:

The following statements were used with 9-point Likert scales in order to find out employees' perceptions of their organisation's focus on health and safety: 'The health and safety of staff is a high priority with management where I work' and 'I believe management where I work would put the continuation of business above my personal safety in the event of a serious incident'. The first statement is sourced from a workplace safety climate scale used in Gershon et al.'s study of the willingness of essential workers to report to duty during a pandemic.[508] The second item is a novel item created for the present study.

Threat perception:

There were three items related to threat perception included in the survey. They all consisted of a question with a 9-point Likert scale ranging from 'Extremely likely' to 'Extremely unlikely'. The three items measured participants' perceptions of: the likelihood of the incident occurring in an area close to their place of work; the likelihood of the incident (if it did occur) causing severe public health consequences; and the likelihood of the incident (if it did occur) putting the participant's own health at risk. Participants were required to complete these scales for all ten of the hypothetical scenarios.

Other organisational factors:

A variety of other organisational factors were measured in the survey, including:

- Length of time working for organisation (in years).
- Number of direct reports (staff who report directly to them).
- Having a current or former business continuity role.
- Previous business continuity or crisis management training.
- Ability to work from home.
- Job security.
- Ease of finding a new job.
- Supervisor or manager considering views.
- Being involved in conflicts at work.
- Feeling uneasy about going to work.
- Awareness of workplace bullying.

[508] Gershon et al., 'Factors Associated with the Ability and Willingness of Essential Workers'.

The last four items in this list relate to a model of working climate used in a study by Holmgren et al.; however for the purposes of this study the measures were analysed separately.[509] This decision was made due to the possibility of the items being related separately to the primary outcome variable.

Ability to go to work:

Participants were asked to indicate their ability to report to work (described as their ability to get to work and perform their duties) for each of the 10 incidents. They could select 'Able', 'Not Able' or Not Sure' for each incident separately. As with the primary outcome variable of willingness to report to work, the ability measure was sourced from Qureshi et al.'s study of the correlates of the ability and willingness of healthcare workers to report to duty during catastrophic disasters.[510]

A modified version of the Extended Parallel Process Model:

The Extended Parallel Process Model (EPPM) was originally designed as a theory to explain why some fear appeals fail; either when the appeals do not elicit the desired health behaviour in the public or the public simply reject the messages.[511] More recently it has been used to predict the willingness of local public health workers to report to work during a pandemic.[512] Specifically it has examined how the workers' perceptions of threat and efficacy may influence their willingness to work during an influenza pandemic. The present survey included a modified version of the EPPM used by Barnett et al.[513] For this adapted model the 'threat' variable was determined as the sum of the participant's perceived likelihood of the incident occurring near their place of work and the perceived likelihood of the incident causing severe public health consequences. The 'efficacy' variable was a sum of the participant's belief that reporting to work in the event of a serious incident would make a big difference to the organisation they work for and the belief that if their organisation can continue to function it will make a big difference to keeping the country running.

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[509] Kristina Holmgren et al., 'The Combination of Work Organizational Climate and Individual Work Commitment Predicts Return to Work in Women But Not in Men', *Journal of Occupational and Environmental Medicine* 55, no. 2 (February 2013): 121–27.
[510] Qureshi et al., 'Health Care Workers' Ability'.
[511] Witte, 'Putting the Fear Back into Fear Appeals'.
[512] Barnett et al., 'Assessment of Local Public Health Workers' Willingness to Respond to Pandemic Influenza'.
[513] Ibid.

It was decided to modify the 'efficacy' variable to exclude the variable used by Barnett et al. of participants' confidence that employees can respond effectively to the threat. This decision was taken in order to make the variable more applicable to the present study sample; the previous research applying the EPPM to willingness to work used this measure with healthcare workers, who by reporting to work would have to respond to the threat. For the present survey, it is likely that a large percentage of employees from other sectors would not have to directly respond to the threat when reporting to work. Therefore, an item related to the perceived importance of the employee's organisation continuing to function was included in the 'efficacy' variable. This decision was made because odds ratios revealed the measure to be significantly associated with willingness to report to work in a number of scenarios, and it was more relevant to the present study sample. The threat variables were incident-specific whereas efficacy variables were not.

Individual influences:

Two variables were included in the survey that related to an individual's personality – sensation seeking and resilience. The first, sensation seeking, is a personality trait that has been linked to risky health behaviours. Stephenson et al. evaluated a short 2-item measure and a 4-item measure and found that they both performed well in comparison to the established measures of sensation seeking containing more items, and that the brief measures also had very good internal consistency.[514] The 2-item measure was selected for use in this survey and consisted of two statements alongside a 5-point Likert scale: 'How often do you do dangerous things for fun?' and 'How often do you do exciting things, even if they are dangerous?' A mean score for the two items was calculated for each participant. The individual resilience of the participants was measured using an abbreviated version of the Connor-Davidson Resilience Scale. The scale was originally formulated due to its relevance to treatment outcomes in mental health conditions.[515] Whereas the original scale consists of 25 items, the abbreviated scale has only two items and was found to have good test-retest reliability as well as convergent and divergent validity.[516] A 5-point Likert scale was used to measure agreement to the following statements: 'I am able to adapt to change' and 'I tend to

[514] Michael T. Stephenson et al., 'Brief Measures of Sensation Seeking for Screening and Large-Scale Surveys', *Drug and Alcohol Dependence* 72, no. 3 (December 2003): 279–86.
[515] Kathryn M. Connor and Jonathan R. T. Davidson, 'Development of a New Resilience Scale: The Connor-Davidson Resilience Scale (CD-RISC)', *Depression and Anxiety* 18, no. 2 (September 2003): 76–82.
[516] Sandeep Vaishnavi, Kathryn Connor, and Jonathan R.T. Davidson, 'An Abbreviated Version of the Connor-Davidson Resilience Scale (CD-RISC), the CD-RISC2: Psychometric Properties and Applications in Psychopharmacological Trials', *Psychiatry Research* 152, no. 2–3 (August 2007): 293–97.

bounce back after illness or hardship'.[517] A mean score for the two items was calculated for each participant.

Other Survey Items:

The survey also included a small number of questions which were not used as predictor variables but used to gain a greater level of understanding of the topic.

Barriers and Facilitators:

Two multiple response questions asked participants to select any of the following factors that could 1) prevent them from reporting to their usual place of work in the event of a serious incident and 2) motivate them to report to their usual place of work in the event of a serious incident. Table 4.1 presents the barriers and facilitators included in the survey.

Table 4.1 Barriers and facilitators - multiple response survey options

Barriers	Facilitators
Childcare responsibilities	Because it is my duty to report to work
Eldercare responsibilities	Because my colleagues would report to work, therefore so should I
Transport problems	Because my colleagues might not report to work, therefore I should
If I had a lack of knowledge about the specific incident	Because I get paid to go to work
Fear for my own health or safety	Because I would want to carry on as normal
Fear for my significant others' health or safety	Because I would want to be around colleagues for support
Stress/anxiety	Because I would be concerned about losing my job if I didn't report to work
I don't care about my job that much	If I was provided with an extra financial incentive
I volunteer for another organisation	If I felt I had enough knowledge about the incident
Not sure	If my organisation kept me up to date with frequent communication
Other (open response)	Not sure
	Other (open response)

Other job-related questions:

The survey also contained questions related to: sector; organisation size and workplace type; commuting; BCM training; being informed about business continuity plans; perceptions of how

[517] Ibid.

much their employer has considered their willingness to report to work during an incident; disability; pregnancy; and questions related to equipment needed to work from home. Some of these were initially considered as predictor variables but due to the variability in responses between the categories, these were considered unsuitable for analysis using odds ratios or they were considered too similar to other variables and were removed to simplify the analysis. Some were included in the survey with the sole purpose of presenting the findings as descriptive statistics.

Demographics:

Participants were requested to provide information about: gender, age, if they had children, education, the location of their work and their salary. Participants were also asked to rate their health between 'Excellent', 'Very Good', 'Good', 'Fair' or 'Poor'.

Analysis

Survey data was analysed using IBM SPSS 21.[518] All incomplete surveys were removed from the analysis, including surveys where the respondents answered that they were not presently employed in the UK. Due to the key outcome measure being a willingness to report to work, those who indicated that they had worked from home every day in the last 12 months were also removed from the analysis. Free text and 'other' responses were recoded into relevant categories where possible and coded as 'missing data' if recoding was not possible. Reverse-coded items were recoded accordingly.

Prior to calculating odds ratios, multiple cross-tabulations were produced of all categorical independent variables to check that no more than 20% of the expected frequencies were less than 5 and that none of the combinations were empty. Some variables were recoded to ensure they could still be used in the analysis or to simplify the final analysis. Full details of how the survey items will recoded can be found in Appendix C.

The multi-item predictor scales were tested for reliability using Cronbach's alpha. Data for all demographic and predictor variables were tested for normality and showed that data for all variables did not have a normal distribution; therefore Mann-Whitney U tests were used to examine any associations between willingness to work during each incident and all the continuous predictor variables.

[518] IBM, 'IBM SPSS Software', accessed 21 June 2012, http://www-01.ibm.com/software/analytics/spss/.

Chi-square tests for independence were used to test the association between the demographic predictor variables and outcome variable (willingness to work for each incident). Univariate odds ratios were then calculated for any variables found to have a significant association with willingness to work (for each incident). Binary logistic regressions were then used to calculate the odds ratios between the predictor variables and willingness to work for each incident in turn. These regressions controlled for the effects of any demographic variables found to have a significant univariate association with willingness to work (for each incident). Odds ratios were calculated separately for each variable.

Results

Sample size and demographics

When the survey closed on the 26/07/13 and incomplete surveys were removed, a total of 321 complete surveys were included in the data set. The completion rate of the survey sample was 77%. It should be noted that this percentage only takes into account those individuals who clicked on the survey link and went on to complete the survey, the software is not able to calculate the number of people who received the email but did not click on the survey link. Nine of the 321 complete surveys were subsequently removed due to the respondents indicating they worked from home every day for the last 12 months and as such were not useful for the outcome variable 'Willingness to report to work', leaving a final sample size of 312. Out of these 312, 156 (50%) were male, and all participants were aged between 19 and 69. 51.6% were 34 or younger with the mean age for the sample being 37.4 (SD = 11.24). The sample was slightly skewed towards people who had received a high level of education, with 38.7% reporting having a Masters/PhD or equivalent. With regards to location of their workplace, 46.8% worked in London and 53.2% worked outside of London and salary was fairly evenly distributed between the three groups with 32.6% earning up to £30k, 37.2% earning between £30-£50k and 30.2% earning £50k or more. For a full breakdown of demographic data see Table 4.2.

Table 4.2 Full breakdown of participant demographics (n=312)

Demographic Variable	Number of participants/total sample (%)
Gender:	
Male	156/312 (50)
Female	156/312 (50)
Age:	
18-24	23/312 (7.4)
25-34	138/312 (44.2)
35-44	60/312 (19.2)
45-54	56/312 (17.9)
55+	35/312 (11.2)
Children under 18:	
Yes	86/312 (27.6)
No	226/312 (72.4)
Education:	
GSCE/A Level or equivalent (NVQ1-3)	56/305 (18.4)
Bachelor degree or equivalent (NVQ4)	131/305 (43.0)
Masters/PhD or equivalent	118/305 (38.7)
Health:	
Excellent	79/312 (25.3)
Very good	144/312 (46.2)
Good	74/312 (23.7)
Fair	14/312 (4.5)
Poor	1/312 (0.3)
Work location:	
London	146/312 (46.8)
Not London	166/312 (53.2)
Salary:	
Up to £30k	98/301 (32.6)
More than £30k less than £50k	112/301 (37.2)
£50k or more	91/301 (30.2)

To assess whether the sample is demographically representative it must be compared to the demographic breakdown of the target population, those individuals in the UK labour force in employment. To do this, data from the 2013 UK Labour Force Survey and the 2011 census were examined. It should be noted however that the 2011 census only included data from England and Wales.

In the 2013 UK Labour Force Survey (Apr-June) it was reported that 67% of women were in work, compared to 76% of men.[519] Therefore, in the present study sample males are underrepresented. The percentage of present survey respondents aged 35 or over was 48%. From the 2013 UK Labour Force Survey (Feb-Apr) it can be calculated that 61% of employed

[519] Office for National Statistics (ONS), 'Full Report - Women in the Labour Market', September 2013.

individuals over 16 were aged 35 over.[520] Therefore, the older age groups are underrepresented in the present study sample.

The percentage of the UK working population with dependent children is more difficult to estimate as the UK Labour Force Survey uses 'households' and 'families' in their data analysis, as opposed to individuals with children. In the 2011 census, dependent children families accounted for 43% of all families. However, this is not a calculation of the number of currently employed individuals who have dependent children, which is likely to be lower. Although this is more difficult to calculate as not all dependent children live with both their parents, we know that 64% parents of dependent children were in employment at the time of the census.[521] [522]

Data from the 2011 census revealed that 49% of those with no qualifications (aged 25-64) were in employment at the time of the census.[523] In the present sample, no individuals reported having no qualifications, clearly showing this sector of the UK labour force has been excluded from the sample.

In summary, after comparing the present sample to the demographic breakdown of the UK labour force it appears that the present sample is not representative. However, it should also be noted that is not possible for the categories from the Labour Force Survey and UK Census to be directly compared to the categories in the present study, due to differences in definitions and inclusion criteria.

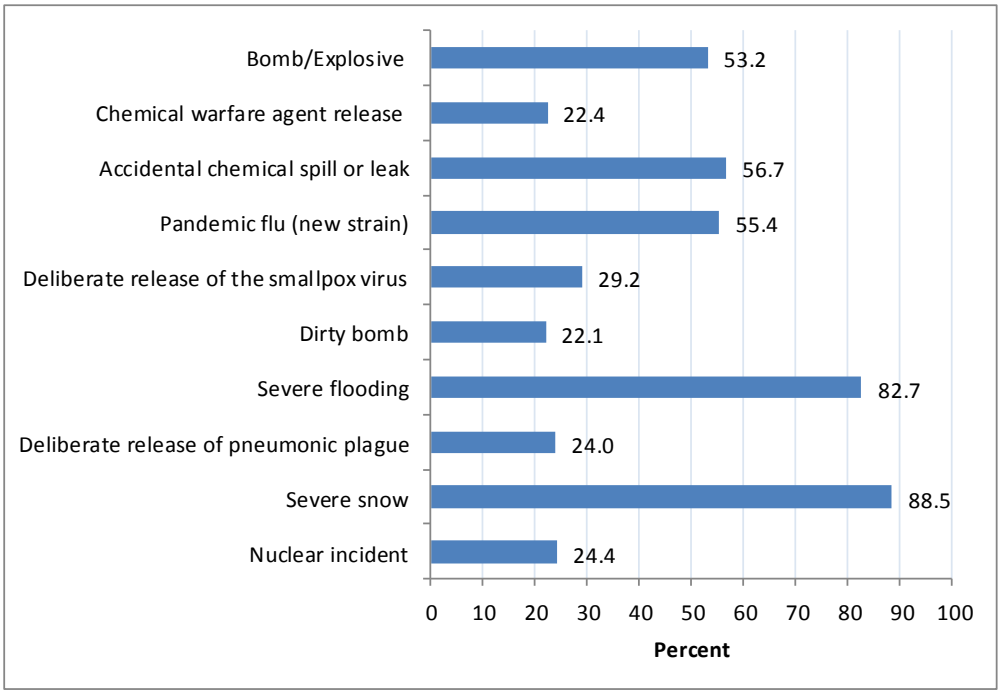
Behavioural outcome variable

Survey results revealed that the number of participants who reported being willing to go to work varied by incident type. The highest rates of willingness were for severe snow (88.5%) and severe flooding (82.7%) and the lowest rates of willingness were for a chemical warfare

[520] Office for National Statistics (ONS), 'Labour Market Statistics, June 2013: Statistical Bulletin', June 2013.
[521] Office for National Statistics (ONS), '2011 Census for England and Wales: Table DC1601EWla - Family Status by Number of Parents Working by Dependent Children in Family by Economic Activity', 2011, http://www.nomisweb.co.uk/census/2011/DC1601EWLA/view/2092957703?rows=dependent_children&cols=economic_activity.
[522] Nomis, '2011 Census - Official Labour Market Statistics', accessed 23 June 2015, https://www.nomisweb.co.uk/census/2011.
[523] Office for National Statistics (ONS), 'Qualifications and Labour Market Participation in England and Wales', June 2014.

agent release (22.4%) and a dirty bomb (22.1%). Figure 4.1 presents the percentages of participants willing to go to work for each scenario.

Figure 4.1. Percentage of participants willing to go to work for each incident (n=312)



Associations between demographic variables and behavioural outcome variable

Significant associations were found between some demographic variables and the behavioural outcome variable of willingness to work for specific incidents:

- Gender was significantly associated with willingness to go to work in the event of severe snow, with males more likely to report being willing to go to work than females (odds ratio [OR] 2.92, 95% confidence interval [CI] 1.36-6.29).
- Age was significantly associated with willingness to go to work in the event of a bomb/explosive device, with participants in the 18-24 age less likely to report being willing to go to work than those over the age of 55 (OR 0.20,95% CI 0.06-0.63).
- Work location was significantly associated with willingness to go to work in the event of a new strain of pandemic flu, a dirty bomb and a nuclear incident. Those working in London were less likely to report being willing to go to work than those working outside London for a new strain of pandemic (OR 0.63, 95% CI 0.40-0.98), a dirty bomb (OR 0.49, 95% CI 0.28-0.85) and a nuclear incident (OR 0.47, 95% CI 0.27-0.80).

These significant associations were controlled for when calculating odds ratios for the predictor variables using binary logistic regressions. The full set of results can be found in Appendix D.

Associations between predictor variables and behavioural outcome variable

Prior to calculating adjusted odds ratios, the reliability of the predictor scales used in the survey was measured using Cronbach's alpha tests. The results were all above 0.7 indicating that all scales were reliable.

Binary logistic regressions were used to calculate odds ratios in order to assess the association between each predictor variable and the behavioural outcome variable of 'willingness to go to work', for all 10 scenarios, adjusted for gender, age or location where appropriate. Table 4.3 presents the frequencies and odds ratios (with 95% confidence intervals) of the variables found to be significant predictors of willingness to work for the majority of incidents (6 incidents or more out of 10). Table 4.4 presents the frequencies and odds ratios (with 95% confidence intervals) of the variables found to be significant predictors of willingness to work for between 3 and 5 incidents. Odds ratios are adjusted for demographic variables where necessary. Significant associations are shown in bold and underlined. Variables found to be significant predictors for 2 incidents or less were not considered reliable predictors and as such are not included in the following tables. The full set of results can be found in Appendix D.

Table 4.3 Significant predictors of willingness to work for the majority of incidents (6 incidents or more out of 10)

	Odds ratios (95% CI), p value									
Predictor Variable	Bomb/Explosive incident	Chemical Warfare Agent Release	Accidental Chemical Spill/Leak	Pandemic Flu (new strain)	Deliberate Release of Smallpox Virus	Dirty Bomb	Severe Flooding	Deliberate Release of Pneumonic Plague	Severe Snow	Nuclear Incident
BCM Role										
Yes	**2.175 (1.345-3.515), 0.002**	1.583 (0.927-2.701), 0.092	**1.769 (1.116-2.805), 0.015**	**1.961 (1.231-3.126), 0.005**	1.574 (0.963-2.574), 0.070	**1.931 (1.116-3.339), 0.019**	1.458 (0.792-2.684), 0.226	**1.901 (1.125-3.211), 0.016**	1.141 (0.555-2.347), 0.719	**2.127 (1.248-3.623), 0.006**
No	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
BCM/CM Training										
Yes	**2.352 (1.469-3.767), 0.000**	1.684 (0.981-2.892), 0.059	**1.933 (1.227-3.045), 0.004**	**2.557 (1.609-4.062), 0.000**	**1.703 (1.038-2.793), 0.035**	**1.929 (1.108-3.358), 0.020**	1.572 (0.867-2.850), 0.136	**1.971 (1.157-3.359), 0.013**	1.213 (0.597-2.463), 0.593	**2.234 (1.298-3.843), 0.004**
No	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Ability to go to work										
Not Able	**0.189 (0.113-0.316), 0.000**	**0.337 (0.194-0.585), 0.000**	**0.208 (0.128-0.338), 0.000**	**0.308 (0.190-0.499), 0.000**	**0.508 (0.310-0.833), 0.007**	**0.436 (0.246--0773), 0.004**	**0.104 (0.037-0.297), 0.000**	**0.447 (0.264-0.757), 0.003**	**0.161 (0.060-0.428)**	**0.301 (0.171—0.529), 0.000**
Able	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Organisational Identification	**1.627 (1.216-2.177), 0.001**	**1.817 (1.279-2.582), 0.001**	**1.420 (1.075-1.877), 0.014**	**1.526 (1.148-2.029), 0.004**	1.265 (0.935-1.710), 0.128	**1.514 (1.076-2.128), 0.017**	**1.678 (1.170-2.406), 0.005**	**1.490 (1.072-2.072), 0.018**	2.944 (1.362-6.361), 0.062	**1.537 (1.103-2.140), 0.011**
Job Satisfaction	**1.229 (1.036-1.459), 0.018**	1.141 (0.927-1.405), 0.214	**1.192 (1.010-1.406), 0.038**	**1.322 (1.114-1.569), 0.001**	**1.251 (1.026-1.526), 0.027**	**0.764 (0.649-0.900), 0.001**	**1.394 (1.144-1.699), 0.001**	1.198 (0.972-1.475), 0.090	1.233 (0.977-1.556), 0.078	**1.391 (1.110-1.743), 0.004**
Belief that going to work during a serious incident will make a big difference to the organisation	**1.123 (1.018-1.240), 0.021**	**1.359 (1.178-1.569), 0.000**	**1.153 (1.046-1.271), 0.004**	**1.229 (1.111-1.360), 0.000**	**1.237 (1.100-1.392), 0.000**	**1.336 (1.158-1.543), 0.000**	**1.259 (1.113-1.423), 0.000**	**1.275 (1.119-1.453), 0.000**	**1.168 (1.012-1.348), 0.034**	**1.375 (1.193-1.584), 0.000**
Belief that organisation continuing to function during a serious incident will make a big difference to keeping country running	**1.173 (1.075-1.280), 0.000**	**1.291 (1.150-1.451), 0.000**	**1.164 (1.070-1.267), 0.000**	**1.254 (1.146-1.371), 0.000**	**1.229 (1.112-1.358), 0.000**	**1.270 (1.128-1.428), 0.000**	**1.138 (1.021-1.267), 0.019**	**1.318 (1.174-1.479), 0.000**	1.075 (0.946-1.222), 0.270	**1.275 (1.138-1.429), 0.000**
Belief that health and safety of staff is priority with management	**0.803 (0.702-0.919), 0.001**	0.874 (0.739-1.033), 0.115	**0.858 (0.755-0.975), 0.018**	**0.825 (0.724-0.940), 0.004**	0.953 (0.828-1.097), 0.503	0.882 (0.749-1.040), 0.136	**0.815 (0.705-0.943), 0.006**	0.918 (0.786-1.072), 0.278		**0.806 (0.678-0.959), 0.015**
Likelihood of incident causing severe public health consequences if it did occur	**0.849 (0.745-0.968), 0.015**	**0.779 (0.666-0.910), 0.002**	0.920 (0.820-1.033), 0.159	0.897 (0.773-1.041), 0.154	**0.802 (0.700-0.920), 0.002**	0.879 (0.753-1.026), 0.102	**0.867 (0.759-0.991), 0.037**	**0.807 (0.694-0.937), 0.005**	0.916 (0.789-1.063), 0.246	**0.822 (0.709-0.952), 0.009**

Table 4.4 Significant predictors of willingness to work for 3 to 5 incidents out of 10

	Odds ratios (95% CI), p value									
Predictor Variable	Bomb/Explosive incident	Chemical Warfare Agent Release	Accidental Chemical Spill/Leak	Pandemic Flu (new strain)	Deliberate Release of Smallpox Virus	Dirty Bomb	Severe Flooding	Deliberate Release of Pneumonic Plague	Severe Snow	Nuclear Incident
Location of work										
London	0.878 (0.549-1.406), 0.589	0.649 (0.377-1.117), 0.119	0.663 (0.422-1.040), 0.074	**0.626 (0.399-0.982), 0.041**	0.704 (0.429-1.154), 0.164	**0.488 (0.279-0.854), 0.012**	0.783 (0.435-1.408), 0.413	0.601 (0.353-1.023), 0.061	1.561 (0.753-3.236), 0.231	**0.466 (0.271-0.801), 0.006**
Not London	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Resilience	1.355 (0.957-1.920), 0.087)	1.203 (0.798-1.815), 0.378	1.320 (0.938-1.856), 0.111	**1.597 (1.126-2.266), 0.009**	1.013 (0.700-1.464), 0.947	1.066 (0.710-1.601), 0.757	**1.272 (1.025-1.577), 0.029**	1.072 (0.722-1.591), 0.730	**1.736 (1.057-2.851), 0.029**	1.342 (0.893-2.016), 0.157
Likelihood of incident putting own health at risk if it did occur	**0.873 (0.785-0.972), 0.013**	0.928 (0.825-1.043), 0.211	**0.858 (0.773-0.952), 0.004**	**0.858 (0.757-0.972), 0.016**	**0.826 (0.747-0.914), 0.000**	0.920 (0.820-1.031), 0.151	0.917 (0.813-1.034), 0.156	**0.867 (0.776-0.969), 0.012**	0.885 (0.770-1.017), 0.085	0.898 (0.804-1.004), 0.060
Length of time spent working for organisation	0.997 (0.964-1.032), 0.878	**1.030 (1.001-1.060), 0.043**	1.012 (0.985-1.039), 0.402	1.022 (0.993-1.051), 0.136	**1.035 (1.007-1.064), 0.013**	**1.041 (1.011-1.071), 0.007**	0.998 (0.964-1.033), 0.919	**1.037 (1.008-1.067), 0.012**	0.977 (0.939-1.017), 0.251	1.028 (0.999-1.058), 0.063

Summary of predictors of willingness to work

For the majority of incidents (6 incidents or more out of 10), employees were more likely to be willing to report to work if they:

- Had a business continuity role (current or former).
- Had previous business continuity or crisis management training.
- Believed they would be able to get to work and perform their duties.
- Had higher levels of organisational identification.
- Had higher levels of job satisfaction.
- Believed that continuing to work in the event of a serious incident would make a big difference to the organisation they work for.
- Believed their organisation continuing to function in the event of a serious incident would make a big difference to keeping the country running.
- Believed that the health and safety of staff was a high priority with management where they work.
- Perceived that severe public health consequences were unlikely.

For between 3 and 5 incidents out of 10*, employees were more likely to be willing to report to work if they:

- Did not work in London.
- Perceived themselves to be more resilient.
- Perceived that their own health being put at risk was unlikely.
- Had been working for the organisation for a longer period of time.

*Although age showed up as a predictor of willingness in 3 scenarios it was not considered a reliable predictor due to inconsistent results. For example, for the bomb/explosion scenario, participants in the 18-24 age group were less willing than those in the over 55 age group, whereas for the accidental chemical scenario the 35-44 age group were less willing than the over 55 age group. For the pandemic flu scenario it was the 25-34 age group who were significantly less willing than the over 55 age group. In contrast, the other categorical variables listed above were considered reliable predictors of willingness to work because they had consistent results with regards to which categories were significantly different to the reference category each time.

A modified version of the Extended Parallel Process Model

Binary logistic regressions were used to calculate odds ratios in order to examine the association between the modified version of the Extended Parallel Process Model and the behavioural outcome variable of 'willingness to go to work', for all 10 scenarios; adjusted for gender, age or location where appropriate.

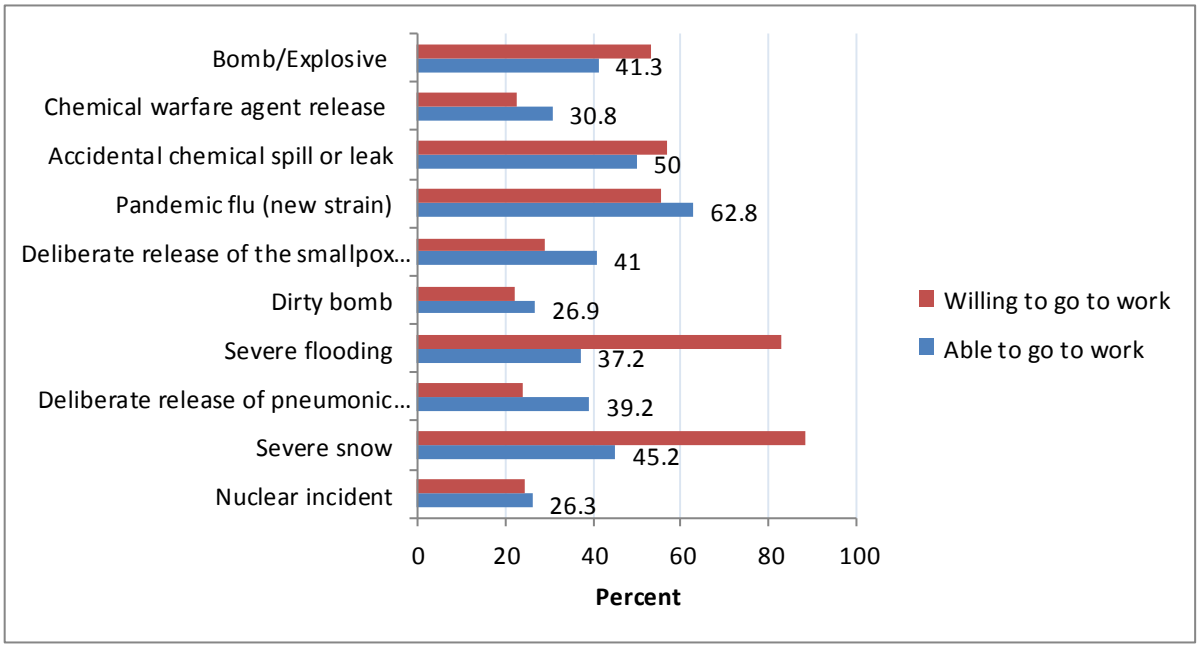
The results showed that the High Threat Low Efficacy (HTLE) group was significantly less likely to report being willing to go to work than the High Threat High Efficacy (HTHE) group for the majority of incidents (8 out of 10). In addition, the Low Threat Low Efficacy (LTLE) group was significantly less likely to report being willing to go to work than the High Threat High Efficacy (HTHE) group for the majority of incidents (6 out of 10). The Low Threat High Efficacy (LTHE) group was significantly less likely to report being willing to go to work than the High Threat High Efficacy (HTHE) group for 2 out of the 10 incidents. There were no significant differences between any of groups for the severe flooding or severe snow scenarios.

Other survey items and analysis

Ability vs. willingness:

As with willingness, perceived ability to go to work in the event of a serious incident varied by scenario. Participants perceived themselves as most able to go to work in the event of a new strain of pandemic flu (62.8%) and an accidental chemical spill or leak (50%). Participants perceived themselves as least able to go to work in the event of a dirty bomb (26.9%) and a nuclear incident (26.3%). As shown in Figure 4.2 the greatest variance between ability and willingness rates were evident for severe flooding (37.2% and 82.7% respectively) and severe snow (45.2% and 88.5% respectively).

Figure 4.2 Percentage of participants able to go to work for each incident compared to percentage of participants willing to go to work for each incident



Barriers and facilitators:

Analysis of perceived barriers to reporting to work during a serious incident revealed that the most frequently selected barriers were: 'Transport problems' (76.7%); 'Fear for my own health or safety' (69.2%); 'Fear for my significant others' health or safety' (47.5%;) and 'Lack of knowledge about the specific incident' (40%). 'Childcare responsibilities' was selected as a potential barrier by 26.6% of participants and stress/anxiety was considered a potential barrier by 23.3%. 5.6% of participants selected 'I don't care about my job that much' as a reason for not reporting to work.

Analysis of perceived facilitators or motivating factors for reporting to work during a serious incident revealed that factors such as: being kept up to date with frequent communication from their organisation (65.5%); having enough knowledge about the incident (63.2%); a sense of duty (53.7%); and a desire to carry on as normal (48.5%) were some of the most frequently selected facilitators. 12.7% of participants reported that an extra financial incentive would be something that might motivate them to report to work in the event of a serious incident. See Table 4.5 and Table 4.6 for response percentages from all barriers and facilitators respectively.

Table 4.5 Percentage of participants selecting each potential barrier

Barriers	N	Response percentage
Transport problems	234	76.7
Fear for my own health or safety	211	69.2
Fear for my significant others' health or safety	145	47.5
Lack of knowledge about the specific incident	122	40.0
Childcare responsibilities	81	26.6
Stress/anxiety	71	23.3
Eldercare responsibilities	47	15.4
I don't care about my job that much	17	5.6
Not sure	3	1.0
I volunteer for another organisation	3	1.0

Table 4.6 Percentage of participants selecting each potential motivating factor (facilitator)

Facilitators	N	Response percentage
If my organisation kept me up to date with frequent communication	201	65.5
If I felt I had enough knowledge about the incident	194	63.2
It is my duty to report to work	165	53.7
I would want to carry on as normal	149	48.5
I get paid to go to work	114	37.1
My colleagues would report to work, therefore so should I	99	32.2
I would want to be around colleagues for support	70	22.8
My colleagues might not report to work, therefore I should	57	18.6
I would be concerned about losing my job if I didn't report to work	48	15.6
If I was provided with an extra financial incentive	39	12.7
Not sure	4	1.3

Working from home:

Results relating to participants' ability to work from home revealed that the majority (91.7%) reported being willing to work from home if their normal workplace was inaccessible during a serious incident; 7.3% of respondents answered 'N/A' indicating that their job was not something they could do from home. Respondents were also asked questions about the equipment they would need to be able to work from home during a serious incident and 62.2% reported that it would have been necessary for them to have brought some equipment home with them the previous day. Despite this, 31.1% said that they did not take the necessary equipment home with them at the end of each day. See Figures 4.3-4.5 for the full breakdown of these survey items.

Figure 4.3 Percentage of employees willing to work from home if normal workplace was inaccessible

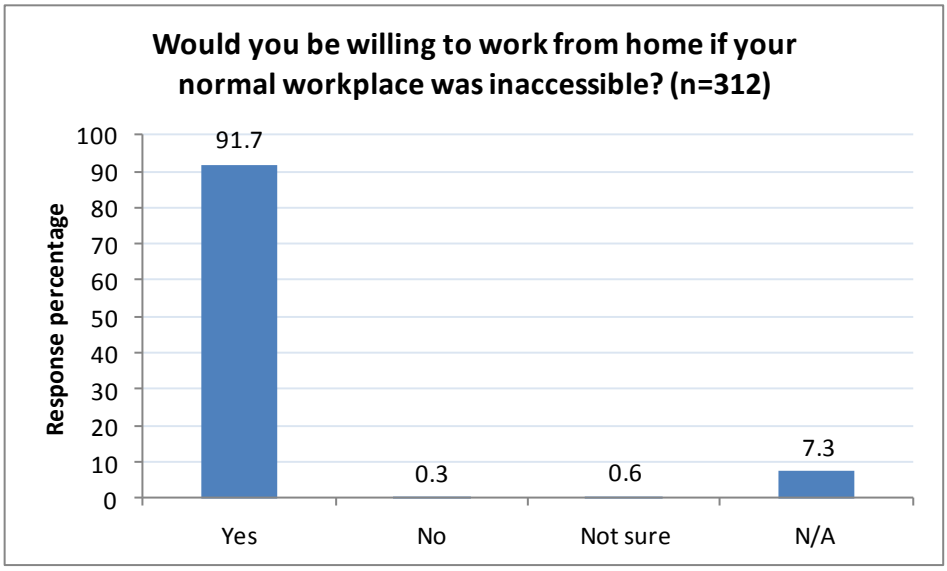


Figure 4.4 Percentage of employees who would have needed to have taken remote access equipment home with them in order to work from home

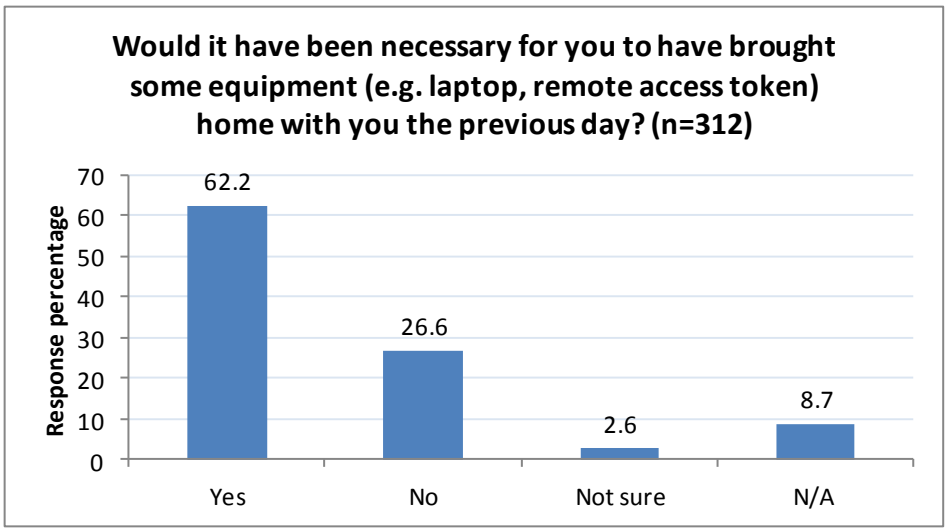
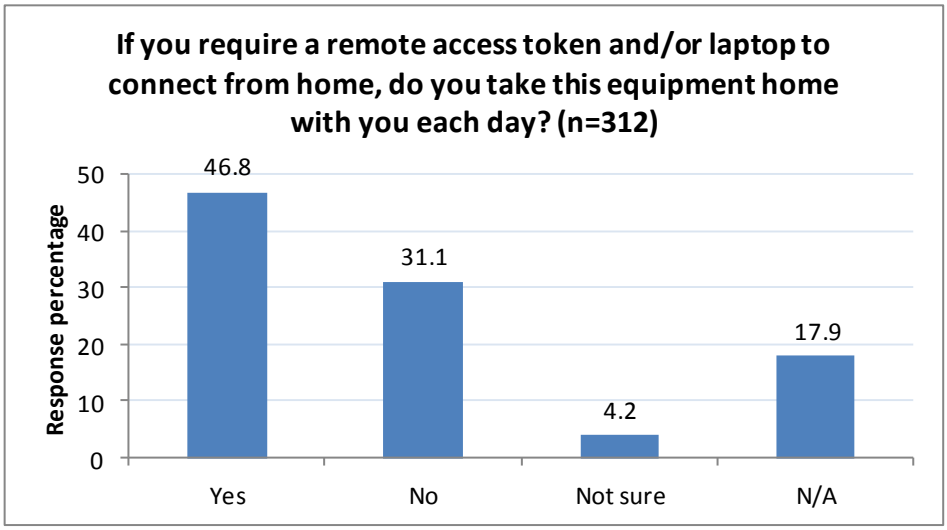


Figure 4.5 Percentage of employees who take remote access equipment home with them each day



Discussion

A web survey of 312 employees who currently work in the UK was conducted in order to examine the factors that predict the willingness of employees to report to work in the event of a range of hypothetical serious incidents, including some involving a CBRN hazard. The results of this survey have shown that not all staff may be willing to report to work during a serious incident, with willingness rates being particularly low for incidents involving a CBRN hazard. This finding is supported by related academic research. For example, Chaffee concluded that healthcare workers might be more willing to report to work in weather disasters or mass-casualty incidents than in CBRN-type incidents.[524] Similarly, in a study of frontline health workers, 78% said they would be willing to report during a weather related event, compared to 67% in an influenza pandemic and 52% in a bioterrorism event.[525] The findings of these studies and of the survey presented in this chapter provide support for risk perception theory that less familiar, more complex incidents (in terms of the hazards involved) such as CBRN terrorism are potentially more fear-inducing than natural disasters or explosions.[526] In light of these findings, employers need to be aware of the potential differences in rates of

[524] Chaffee, 'Willingness of Health Care Personnel to Work in a Disaster'.
[525] Hope et al., 'Willingness of Frontline Health Care Workers to Work During a Public Health Emergency'.
[526] Smith, Burkle Jr., and Archer, 'Fear, Familiarity, and the Perception of Risk: A Quantitative Analysis of Disaster-Specific Concerns of Paramedics'.

absenteeism for different types of incidents. More specifically, that the more fear-inducing incidents such as CBRN events could result in employees being less willing to come to work. Organisations may need to focus more of their planning around the education and reassurance that may be needed for staff during CBRN incidents.

The findings revealed that rates of ability to go to work differed from willingness to go to work. This was not an unexpected finding as a previous research has also found a difference. For example, in a study of essential workers, it was reported that although 80% said they would be able to report to work in a pandemic, only 65% said they would be willing to do so, as a result of a variety of individual and organisational influences.[527] Therefore organisations need to be aware that not all employees who are able to report to work will necessarily be willing to do so.

From a theoretical point of view, the fact that perceived ability to go to work was found to be a predictor of willingness to go to work could be interpreted in a number of ways. Firstly, it is possible that the concepts are closely related in people's minds and survey respondents were not necessarily differentiating between them. They may be thinking that even if they were physically able to get to work they may not be psychologically able to perform their duties if they are not willing to be there. Secondly, it could be that for incidents considered more serious (the ones that people would be less willing to go to work for) participants may be assuming that either the transport network would be temporarily shut down or that their employer had made a decision to close their workplace. Lastly, it is possible that there is another influence on people's perceived ability to get to work not measured in this survey, for example that those who are more willing to go to work might be more likely to try to find alternative modes of transport in order to get to work or be more psychologically able to perform their duties once they are there, and vice versa. Further research is needed in order to clarify these issues.

The measure of organisational identification used in the survey showed an association to willingness to go to work in the majority of scenarios; the more an employee identified with their organisation the more likely they were to report being willing to go to work. To my knowledge this study is the first to examine the association between organisational identification and willingness to go to work during serious incidents. Previous research has looked at the links between organisational identification and other organisational factors such

[527] Gershon et al., 'Factors Associated with the Ability and Willingness of Essential Workers'.

as job satisfaction, motivation, and wellbeing.[528] One study of new US Army recruits reported a link between organisational identification and military attrition and another study of physicians discovered that strength of organisational identification was positively associated with voluntary cooperation at work.[529] [530] The present study provides more support to the theory that organisational identification is linked to positive workplace behaviours and as such is something that should be promoted and embedded into an organisation's culture. Some ideas for how companies can increase levels of organisational identification amongst their employees (e.g. through leadership and corporate language) are discussed in Chapter 6.

The findings of the survey study revealed an association between job satisfaction and willingness to go to work in the majority of scenarios. The more satisfied an employee was with their job the more likely they were to report being willing to go to work. This is the first time that an association between willingness to go to work during serious incidents and job satisfaction has been explored. Although the present results indicate that job satisfaction is a predictor of willingness to work, there has been some debate in the academic literature whether commitment to a company develops from job satisfaction or alternatively whether commitment to a company causes an individual to feel more positive and satisfied towards it, meaning they are less likely to want to leave (see Tett and Meyer for a discussion of the debate).[531] The mechanisms involved in the association between job satisfaction and willingness to go to work during a serious incident warrant further investigation; however for the purpose of the present study it can simply be interpreted that those employees who are more satisfied with their jobs are more likely to report being willing to go to work during a serious incident. Organisations may be aware that satisfied employees might be more productive employees, but they may not have considered the influence job satisfaction could have on employees' willingness to report to work during extreme events.

The findings of this study have shown that an individual's role, or perception of their role, has a significant influence on their willingness to report to work in the event of a number of serious incidents. More specifically, those individuals who perceived that going to work during a serious incident would make a big difference to the organisation they worked for were significantly more likely to report being willing to go to work. Similarly, those who perceived that their organisation continuing to function in a serious incident would make a big difference

[528] Wegge et al., 'Work Motivation, Organisational Identification, and Well-Being in Call Centre Work'.
[529] Mael and Ashforth, 'Loyal From Day One'.
[530] Dukerich, Golden, and Shortell, 'Beauty Is in the Eye of the Beholder'.
[531] Tett and Meyer, 'Job Satisfaction, Organizational Commitment, Turnover Intention, and Turnover'.

to keeping the country running were significantly more likely to report being willing to go to work. This is a perception that could apply to employees who work for national infrastructure organisations. Past research has examined the sense of duty healthcare workers may feel when deciding whether or not to report to work during an infectious disease outbreak.[532] [533] One study found that responders were more likely to say they would stay at work during a bioterrorist incident than media workers and other residents.[534] Although the current web survey was unable to ascertain enough detail about the actual roles and duties of all participants, it did identify an association between perceived importance of role and perceived importance of the organisation's role and willingness to work for the majority of incidents.

In addition, a study by Smith and Walton revealed that staff who were not (or at least did not feel they were) as important were more likely to show a preference towards home responsibilities, or to feel they would be in the way if they came to work and so it would be better if they were to stay away.[535] The implication of these findings for organisations is that those employees who do not think they can do anything useful in the event of serious incident, or do not see the wider picture in terms of their organisation's role in keeping the country running, will be less likely to report to work. It is therefore vital that organisations communicate to employees the importance of their individual roles during an emergency, both in terms of the recovery of the business and the country as a whole. Future research should investigate the influence that specific job roles might have on the willingness of employees (in all sectors) to report to work during serious incidents.

The results of the study also revealed that having a BCM or crisis management role (or a former role) was associated with willingness to go to work for the majority of incidents. Also, having received some business continuity or crisis management training was significantly associated with willingness to work for the majority of incidents. One potential reason for this association could be that by receiving training about business continuity individuals become more aware of the role staff play in business continuity. Alternatively, it could be that receiving training about the types of incidents that cause serious disruption to a business leads to employees feeling more confident in their ability to report to work, which in turn leads to them being more willing to report to work. Research suggests that training and preparedness activities have the ability to influence perceived self-efficacy in responding to a CBRN incident.

[532] Shaw et al., 'The GP's Response to Pandemic Influenza'.
[533] Ehrenstein, Hanses, and Salzberger, 'Influenza Pandemic and Professional Duty'.
[534] DiGiovanni, Jr. et al., 'Community Reaction to Bioterrorism'.
[535] Smith and Walton, 'Returning to Work after the Big One'.

In a study of Australian paramedics it was found that those who had completed recent training perceived themselves as more competent to respond to a CBRNe incident than those without recent training; and training was a stronger predictor of perceived response readiness than experience of responding to a CBRNe incident.[536] In light of these findings, organisations could involve staff in their business continuity planning, something which could not only increase the knowledge of employees so that they know what they should do in an extreme event, but also increase their confidence in their ability to respond effectively to the situation. However, more research is needed to examine, in detail, the potential reasons why BCM training is associated with willingness to work; particularly with staff for whom responding to an incident is not part of their normal role. It is also important to compare different types of BCM activities, such as staff awareness through communications, staff discussion groups/seminars, exercises and different types of training (classroom vs. e-learning) and to consider the costs and benefits of each.

Another significant predictor of willingness to go to work during a serious incident was the perception that the health and safety of staff is a priority with management. Similarly, a study by Gershon et al. discovered that provision of respiratory protective equipment and a high level of trust in their employer were associated with essential workers' willingness to work during a pandemic.[537] It has been suggested by Barnett et al. that an organisation should provide assurances to employees of the measures they would take in an incident to protect their personal safety and thus make the employees more confident that the organisation would be able to control the situation.[538] The authors also suggest that it could be useful for organisations to make their health and safety interventions more conspicuous to employees, as discussions involving risk perception theories suggest that a lack of confidence in workplace safety could lead to increased feelings of dread for employees in the event of an incident.

Furthermore, informing employees where they should go to access updates and information in a crisis may increase their sense of control, which may in turn have an effect on their risk perception and level of concern.[539] One study found that individuals who were confident in their employer's ability to respond appropriately were not only more likely to be willing to work in the first place, but were also more likely to be willing to change roles during a

[536] Garry Stevens et al., 'Determinants of Paramedic Response Readiness for CBRNE Threats', *Biosecurity and Bioterrorism: Biodefense Strategy, Practice, and Science* 8, no. 2 (June 2010): 193–202.
[537] Gershon et al., 'Factors Associated with the Ability and Willingness of Essential Workers'.
[538] Barnett et al., 'Applying Risk Perception Theory to Public Health Workforce Preparedness Training'.
[539] Ibid.

pandemic.[540] This is important because during and in the aftermath of an incident a flexible and adaptive workforce is essential to facilitate a timely return to normal functioning. The results of the present study support the finding that confidence in an organisation's approach to health and safety is associated to willingness to work, and this association also applies in incidents other than a pandemic. Due to these findings, organisations should maintain a focus on the health and safety of their employees and also communicate this focus to the employees themselves.

The present study has provided some support for the Extended Parallel Process Model (EPPM), a model that incorporates an individual's perception of threat and efficacy.[541] This is the first time an academic study has applied the EPPM to the willingness of employees other than healthcare workers to report to work during serious incidents. However, as noted, this was a modified version of the EPPM to make it more applicable to the present study population; the efficacy variable was related to the perceived importance of role and organisation. The primary purpose of the EPPM is to provide a framework for effective risk communication.[542] It was originally designed to explain the successes and failures of fear appeals, however more recently it has been applied to other topics such as the effectiveness of workplace safety messages.[543] The model has also usefully been applied to the topic of staff willingness to work, with a focus on healthcare workers.[544] The EPPM explains behavioural responses using just two main constructs, threat and efficacy and can be considered a parsimonious model.[545] The present analysis measured these concepts and, as such, threat is discussed in relation to being 'concerned' and efficacy is related to feeling 'important'. The results revealed that those employees who fitted a 'concerned and important' profile were more likely to report being willing to work than those who were 'concerned and not important' and those who were 'not-concerned and not-important'. However, the analysis also revealed that those who fitted a 'concerned and important' profile were more willing to report to work than those who were 'not-concerned and important' in only two out of the ten incidents. Therefore, these results have shown that for the present study sample, perceived efficacy in terms of perceived

[540] Tippett et al., 'Anticipated Behaviors of Emergency Prehospital Medical Care Providers during an Influenza Pandemic'.
[541] Witte, 'Putting the Fear Back into Fear Appeals'.
[542] Erin K. Maloney, Maria K. Lapinski, and Kim Witte, 'Fear Appeals and Persuasion: A Review and Update of the Extended Parallel Process Model', *Social and Personality Psychology Compass* 5, no. 4 (1 April 2011): 206–19.
[543] Michael Basil et al., 'Applying the Extended Parallel Process Model to Workplace Safety Messages', *Health Communication* 28, no. 1 (2013): 29–39.
[544] Barnett et al., 'Assessment of Local Public Health Workers' Willingness to Respond to Pandemic Influenza'.
[545] Maloney, Lapinski, and Witte, 'Fear Appeals and Persuasion'.

importance of role/organisation has a stronger association with willingness to work than perceived threat. A possible explanation for this is that being willing to work was not significantly associated with a low perceived likelihood of the event occurring.

The difference between threat and efficacy is similar to a finding reported by Barnett et al. who discovered that out of perceived threat and perceived efficacy, perceived efficacy was the more influential component in determining public health workers' willingness to work in a pandemic.[546] Barnett et al. concluded that those employees who fit a 'concerned and confident' profile are most likely to be willing to report to work during a pandemic, a concept which is partially supported by the present findings. Therefore it is recommended that organisations should focus their messaging on increasing perceptions of efficacy before attempting to change employees' perceptions of the threat. Organisations could focus on strengthening employees' confidence in their ability to do something to help by reporting to work and communicating the importance of the recovery of their organisation.

For 3 incidents out of 10, employees were more likely to be willing to report to work if they did not work in London. The reasons for this difference are not clear from the data; however a possible explanation might lie in the fact that the majority of those who work in London use public transport to get to work. For those incidents with an element of contagion or contamination it is likely that coming into contact with other commuters could be a potential source of fear for many individuals. The focus group study addresses this issue in Chapter 5. It is important to note, however, that this could be a result of living in a city and may not be unique to London. More research is needed to ascertain if living in a city or urban area has an effect on willingness to work in certain scenarios, and whether the use of public transport is the reason for this effect.

Similarly, for a minority of incidents those individuals who perceived themselves as more resilient were more likely to be willing to go to work. It is logical that those who are more confident in their own ability to bounce back and recover from negative situations would be more willing to put themselves at risk by going to work; however, as this was only a significant association for three incidents (pandemic flu, flooding and snow) it is not considered a reliable predictor for serious incidents in general. It is interesting to note however that perceived personal resilience only has an association with willingness to go to work for incidents with which the participants were likely to be more familiar with or have experienced before. As

[546] Barnett et al., 'Assessment of Local Public Health Workers' Willingness to Respond to Pandemic Influenza'.

these two factors, work location and resilience, were significant predictors of willingness to work in only 3 out of the 10 scenarios it is difficult to draw any meaningful conclusions. However, they are potential influences that could be considered in further research, particularly research examining why they might be predictors of willingness to work in some scenarios and not others.

The findings suggested a possible association between age and willingness to work. The oldest age group in the sample was significantly more likely to report being willing to work than a younger age group for 3 out of the 10 incidents. As with work location and resilience, it is difficult to draw any meaningful conclusions from this, especially as it was not always the same younger age categories involved. However, the systematic literature review reported in Chapter 2 revealed that similar associations have previously been found by academics. For example, Bar-Dayan et al. found that younger employees (those between 18 and 24), were significantly less likely to report being willing to risk their life for a patient during an A/H1N1 pandemic than employees in the older age groups.[547] Similarly, a study by Ogedegbe et al. reported that being in an older age group was a significant predictor of willingness to work in a disaster. [548] However, other researchers have disagreed that age is associated with willingness. For example, Burke et al. concluded that age of paediatric healthcare employees had no association with willingness to report to a disaster and Considine and Mitchell found no significant correlations between nurses' willingness to participate in CBR incidents and age.[549] [550] In light of the findings of this research and previous studies it is recommended that the association between age and the willingness of staff to go to work is a feature of research in the future. If an association between age and willingness to work exists, then organisations could be made aware of the age groups less likely to report to work, which could inform the development of targeted communication and interventions.

The length of time an individual had been working for their present organisation was significantly associated with the likelihood of them being willing to go to work for 4 out of the 10 incidents. Specifically, the greater number of years they had been working for the organisation the more likely they were to say they would be willing to go to work during the incident. Interestingly the 4 incidents this association was present for were all CBRN incidents (chemical warfare agent, smallpox, dirty bomb and pneumonic plague) and the association for

[547] Bar-Dayan et al., 'Who Is Willing to Risk His Life'.
[548] Ogedegbe et al., 'Health Care Workers and Disaster Preparedness'.
[549] Burke et al., 'Factors Associated with Willingness to Respond to a Disaster'.
[550] Considine and Mitchell, 'Chemical, Biological and Radiological Incidents'.

willingness to go to work in a nuclear incident and length of time working for an organisation was also approaching significance. Therefore it seems that those who have been working for an organisation for longer will be more likely to go to work during a CBRN incident. The reasons for this cannot be interpreted from the data and it is possible that some other factors not measured by the present study are mediating this association. However, it is still an interesting finding and one that warrants further investigation from research in the future.

An unexpected finding of the present study was that there was no gender difference in willingness to work for the majority of incidents. This is an unexpected finding as risk perception research has generally shown that females perceive hazards as more severe than males.[551] Qureshi found that being female lowered the likelihood of being willing to report to work during a catastrophic disaster for most types of events. However, it is unclear from the article what the authors' definition of 'most' types of events is. In the present study, the only gender difference observed was during a severe snow incident, where females were less likely to report being willing to go to work. There is a potential explanation for this gender difference in the academic literature, with some researchers reporting a gender difference in driving perceptions and behaviour during bad weather. For example, one study reported that females were more likely to acquire information about the weather forecast before a trip and another study found that women expressed less comfort than men for driving in bad weather.[552] [553] However, it is not clear from the present survey what the cause of this gender difference is and as such it requires further research to examine this issue in greater detail. The idea that females might be more concerned about driving in bad weather is something that organisations could keep in mind however, and could provide guidance about driving in bad weather to all employees.

For the present study, having children did not have a significant association with willingness to work; however, this is not an unexpected finding as Smith and Walton also found that having dependent children had less of an influence on attitudes to returning to work after an earthquake than the researchers expected.[554] It should be noted that the findings from this web survey must be used with caution due to the small percentage of respondents who

[551] Muriel Bouyer et al., 'Personality Correlates of Risk Perception', *Risk Analysis* 21, no. 3 (June 2001): 457–66.
[552] Markku Kilpelainen and Heikki Summala, 'Effects of Weather and Weather Forecasts on Driver Behaviour', *Transportation Research Part F: Traffic Psychology and Behaviour* 10, no. 4 (July 2007): 288–99.
[553] Jacqueline Bergdahl, 'Sex Differences in Attitudes toward Driving: A Survey', *The Social Science Journal* 42, no. 4 (October 2005): 595–601.
[554] Smith and Walton, 'Returning to Work after the Big One'.

reported having dependent children (28%). This may also explain why only 26.6% of respondents reported childcare as a potential barrier to reporting to work. Furthermore, the current survey was not able to examine the influence of having children on willingness to work in detail, as other factors such as the age and health of the children, as well as the specific childcare arrangements of the family would have to be taken into account. Future research should examine these issues in more detail with a larger sample. Despite these sample limitations, it is clear that having children who are ill or whose schools are closed will cause some parents problems. Past research has shown childcare issues to be a frequently reported barrier to healthcare workers reporting to work during a serious incident.[555] [556] [557] In light of this it is recommended that organisations consider parental obligations in their business continuity planning, either in terms of the provision of childcare or more flexible working from home arrangements.

The specific barriers and facilitators reported by participants in the present study support the findings of previous academic studies that have examined these factors. The most frequently cited barrier from the present study was transport problems. In previous research with healthcare workers transportation problems was a frequently cited barrier to reporting to work during a public health emergency; and was selected more frequently for an earthquake scenario than an influenza pandemic scenario.[558] Fear for self and fear for significant others' health or safety were found to be the next two frequently cited barriers to reporting to work during a serious incident. This finding is supported by a study by Qureshi et al. who reported that the most frequently cited barriers to healthcare workers reporting to work during catastrophic disasters were fear and concern for family and self.[559] The finding that concern for significant others' health or safety is a potential barrier to staff reporting to work provides some support for Killian's theory of 'role conflict'.[560] Killian suggests that during a disaster, individuals would be faced with a conflict between their role in their family and their role in an organisation. Killian noted that in a disaster situation this conflict could be resolved in favour of loyalty to the family. Therefore, it is recommended that organisations take time to understand the concerns and practical barriers that staff may face in the event of a serious incident, as these concerns could prevent staff from reporting to work. A possible method for

[555] Adams and Berry, 'Who Will Show Up?'.
[556] Garrett, Park, and Redlener, 'Mitigating Absenteeism in Hospital Workers during a Pandemic'.
[557] Gershon et al., 'Pandemic-Related Ability'.
[558] Stergachis et al., 'Health Care Workers' Ability and Willingness to Report to Work During Public Health Emergencies'.
[559] Qureshi et al., 'Health Care Workers' Ability'.
[560] Killian, 'The Significance of Multiple-Group Membership in Disaster'.

doing this is to involve staff in planning and particularly in exercises, giving them a chance to voice their concerns and their specific needs during different scenarios.

For facilitators, or the factors that might motivate employees to report to work, the most frequently selected factors were receiving frequent communication from their organisation and having enough knowledge about the incident. Academic researchers have suggested that keeping individuals informed during emergencies reduces their stress and allows them to act efficiently.[561] Due to lack of knowledge there is also potential for an 'information void' to occur during a CBRN incident or other uncommon event such as an outbreak of a novel virus, which could increase feelings of dread.[562] In a study of student nurses it was found that their concerns for safety were based on inaccurate knowledge; for example that they could pass anthrax onto their families after treating patients who had contracted inhalation anthrax.[563] Furthermore, a study of public health workers in the US found that those who had read the pandemic influenza plan were more likely to report a willingness to work during a pandemic.[564] The present study provides support for these findings and shows the importance of communication and information during extreme events and the potential impact it could have on employees' decisions about whether or not to report to work.

An unexpected finding with regards to facilitators was that only 12.7% of participants reported that an extra financial incentive might motivate them to report to work in the event of a serious incident. It is possible that this figure is low because of the serious nature of many of the incidents used in the survey; it is possible that other factors become more important than money when there is a perceived threat to the health of an individual or his/her family. As with the potential barriers employees might face, organisations need to take the time to find out the potential factors that might motivate their staff to return to work during a serious incident and include these in their planning.

The survey results revealed a very high level of willingness among participants for working from home if their normal workplace was inaccessible during a serious incident. However, a potential problem with accessibility was revealed. Although the majority of employees said they would have needed to have taken some remote access equipment home with them at the end of the day in order to work from home, over a third admitted that they did not take this home with them each day. This is potentially a very serious problem if organisations are

[561] Drury, 'Managing Crowds in Emergencies'.
[562] Barnett et al., 'Applying Risk Perception Theory to Public Health Workforce Preparedness Training'.
[563] Young and Persell, 'Biological, Chemical, and Nuclear Terrorism Readiness'.
[564] Basta, Edwards, and Schulte, 'Assessing Public Health Department Employees' Willingness'.

assuming that providing the necessary remote access equipment to employees is sufficient to ensure they can work from home. Therefore, organisations need to encourage their staff to take home their remote access equipment at the end of each day, and not to assume that simply providing the equipment is enough. This issue is explored further in Chapter 5.

Methodological limitations

The main limitations of the present survey study relate to the sampling method employed – snowball sampling (also known as chain-referral sampling). This method was selected due the fact it was convenient, it did not cost anything and was not as labour-intensive as some other methods (e.g. quota sampling). However, snowball sampling as a data collection method has a number of shortcomings that need to be addressed here. Firstly, snowball sampling frequently results in a sample that is not random and is often not representative of the target population. Using this technique can result in large sections of the target population being omitted from the sample. Secondly, using snowball sampling means it is impossible to calculate the true response rate of the survey, due to the fact that it is impossible to know who has received the survey link but has decided not to click on it. All that can be calculated is the completion rate, which is the percentage of individuals who clicked on the survey link and went on to complete the survey. Although the results of this method can be useful, it is important to note that they should not be generalised to the whole population. It is often better to view results of this type as a 'proof of concept' and something that can be confirmed or challenged using a larger and more representative sample when time and funds allow.

Another of the potential limitations of the current study is due the fact it is a web survey it is only filled in by those individuals with an internet connection. Although this is less of a problem now than it would have been five years ago, with more and more people connecting through smart phones and tablets, it is still possible that the sample was not representative of the working population. However, unlike other types of research, the sample included only those individuals who were currently employed, so children and the elderly (those least likely to have internet connections) were excluded anyway. The sample was also shown to be skewed in favour of those who work in London and some other regions were underrepresented. Due to the snowball sampling technique employed, it is not possible to assess the impact of a non-response bias on the results as the survey software cannot calculate numbers of individuals who received the email but chose not to click on the survey link. This is a problem with this type of research and something that could be improved if a

telephone survey method was used rather than a web survey, or if the email was only sent to pre-selected individuals. However, reassurance is provided by the fact that the results of this survey follow similar trends to those reported in previous surveys, for the measures previously studied.

A further limitation of the sample is that it is possible certain personality types were more likely to fill in the survey resulting in a further non-response bias. Firstly, it could be that those who are naturally more anxious by nature might not have wanted to fill in a survey about incidents that are so fear-inducing. This may mean that willingness rates have been underestimated. Secondly, it is possible that people who are generally more helpful in other aspects of their lives were more likely to complete the survey. It is possible these more helpful people would be more willing to help during emergencies and therefore the willingness rates could have been overestimated. Another potential sample bias could have occurred due to the fact that the survey was less likely to be completed by employees with operational or business critical roles and those who do not use a computer at work. However, as the survey was also sent out through both personal and professional networks, including business continuity professionals, this helped to mitigate this potential problem.

Due to the anonymous nature of the data collection and the difficulty in creating a closed survey item that asked about all potential occupations and organisations, it was not possible to ascertain what type of organisation the respondents worked for, or their specific job role. This is a potential limitation of the study as it is possible individuals who work for different types of organisations, and in different roles, will have different motivations for reporting to work during extreme events. This also meant that it was not possible to solely collect data from those who work in national infrastructure organisations and as such the results should be generalised across sectors with caution.

A final limitation of the present survey can be found in the scenarios used to assess individuals' willingness and ability to report to work. Although these were piloted within the author's networks, it is possible that respondents' perceptions of the scenarios may have differed, which makes it difficult to perform a reliable comparison between individuals. It is possible that the incidents, for example a nuclear incident or dirty bomb, are perceived differently by people and thus could have affected their responses when asked about their behavioural intentions.

Future research could improve the present study by using a demographically and geographically representative sample, as well as a sample that is representative of all UK national infrastructure sectors and roles. It should aim to include participants who do not regularly use the internet, as this is a section of the UK workforce that may have been missed by this survey. Quotas for use in representative sampling could be informed by using the UK Labour Force Survey. This would ensure the correct percentages of males and females, age groups, part-time and full-time employees and the various salary brackets (as well as other factors) are included in the sample. It would also be useful to understand the demographics of those individuals who choose not to fill in a survey of this sort; something which is not possible using snowballing or opportunistic sampling for an online survey. A population survey is likely to be both costly and time-consuming, therefore another option would be to survey a sample of employees from within a specific organisation and directly compare these results to a matched sample from another organisation; this could either be within the same sector or across different sectors. With regards to the survey content, an improvement could be made to the scenarios used; more description about the individual scenarios (e.g. how many cases of plague, how many casualties from the explosive device etc.) would be helpful to people when deciding whether or not they would report to work.

Conclusions

This study has been the first of its kind to examine a number of unique predictors of willingness to work for a range of different scenarios, using a sample which is not solely employees of the health sector or essential workers. Measures from organisational psychology such as organisational identification and job satisfaction have been applied to the topic for the first time and the Extended Parallel Process Model has also been used to examine the willingness to work of non-healthcare workers for scenarios other than pandemic. Overall, it has been shown that organisations should plan for significant rates of absenteeism during serious incidents because of employees not being willing to go to work rather than simply not being able. It has also shown that organisations should expect their staff to be less willing to work in CBRN incidents than less serious or more familiar incidents such as snow and flooding or a bomb/explosive incident. The survey has also highlighted the importance of organisational communication and the findings have been used to suggest ways in which communication can be used to facilitate employees' willingness to work during serious incidents.

These survey results, along with the results of the interview study have been used to inform the next phase of data collection, the employee focus groups. A pneumonic plague release scenario was selected due to the low rates of willingness for that scenario identified in this study. Only participants who do not have a business continuity role were recruited to the focus groups due to the finding that rates of willingness differ significantly between the two groups and, as such, business continuity employees could have influenced other employees during the discussions with their responses and potentially increased levels of knowledge. Due to the finding that not all individuals take their remote access equipment home with them at the end of each day, this was included in the focus group discussion guide. The potential concerns about using public transport during an infectious disease outbreak were also examined, as the survey did not explore this topic. Chapter 5 describes this scenario-based focus group study. Some suggestions for further research based on the findings of this survey study are suggested in Chapter 6.

Chapter 5: Focus Group Study

Introduction

The overarching aim of this project was to examine the likely behaviour of staff during and in the aftermath of a high-impact, low-probability event, such as one that involves a CBRN hazard. As revealed in Chapter 3, the majority of national infrastructure organisations involved in the research do not involve staff in exercises nor do they ask staff about their potential concerns or information needs in the event of a catastrophic event such as a CBRN incident. Instead, they make a variety of largely unsupported assumptions about the willingness of their staff to report to work. In addition, results of the web survey reported in Chapter 4 revealed that a high percentage of employees may be unwilling to report to work in the event of an incident that involves a CBRN hazard. This chapter reports the results of a focus group study designed to further explore and develop these findings. The focus groups were made up of employees of national infrastructure organisations and examined their likely concerns, behavioural intentions, information needs and expectations of their employer in the event of a hypothetical CBRN incident.

Focus groups are a useful way to examine the effect of the provision of information on people's behavioural intentions and have been widely used in past research examining risk communication.[565] [566] [567] [568] [569] [570] Using focus groups in the development of risk communication can result in more effective communication because it enables communicators to listen to consumers of the risk messages.[571] This study made use of different modes of communication (a television news report, a news website article and social media) and assessed employees' reactions to these mock injects.

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[565] Rae Zimmerman et al., 'Risk Communication for Catastrophic Events: Results from Focus Groups', *Journal of Risk Research* 13, no. 7 (October 2010): 913–35.
[566] Becker, 'Emergency Communication and Information Issues'.
[567] Glik et al., 'Public Perceptions and Risk Communications for Botulism'.
[568] Wray and Jupka, 'What Does the Public Want to Know in the Event of a Terrorist Attack Using Plague?'.
[569] Wray et al., 'Communicating with the Public about Emerging Health Threats: Lessons from the Pre-Event Message Development Project'.
[570] Pearce et al., 'Communicating with the Public Following Radiological Terrorism'.
[571] William H. Desvousges and V. Kerry Smith, 'Focus Groups and Risk Communication: The "Science" of Listening to Data', *Risk Analysis* 8, no. 4 (December 1988): 479–84.

One advantage of using focus groups as a data collection method with the public is that they encourage those people who would find a one-on-one interview intimidating to take part, so that all types of personality are included in the research.[572] It is also not just the responses the participants give to the moderator's questions that are important, but the exchange between the research participants. Due to the fact that participants provide an audience for each other and can provide opinions and contrasting views, participant interaction results in a greater variety of discussion than would be evident in one-on-one interviews.[573] Group discussions allow participants to explore their own views and opinions, using anecdotes and arguments, thus helping the researcher to understand more about what participants know or have experienced than would be possible through other methods of data collection.[574]

Past research has used focus groups to examine public reactions, responses and information needs in the event of various hypothetical CBRN incidents. For example, Pearce et al. conducted focus groups in Britain and Germany to examine the behavioural intentions and information needs of the public in the aftermath of the hypothetical discovery of a radiological exposure device (RED).[575] Similarly, Rogers, Amlôt and Rubin used focus groups to assess the impact of communication materials on public responses to a hypothetical RDD incident.[576] Other studies have used focus groups to examine public reactions to hypothetical CBRN scenarios such as attacks involving plague, VX and botulinum toxin.[577] [578] [579]

Therefore, although there have been a number of focus group studies examining general public responses and reactions to CBRN incidents, there has been much less focus on *employee* responses to such events. A few studies have used focus groups to investigate employee responses to incidents such as anthrax, Rift Valley Fever Virus and natural disasters; however these have not specifically looked at willingness to report to work, which is one of the key

[572] Jenny Kitzinger, 'Qualitative Research. Introducing Focus Groups.', *BMJ* 311, no. 7000 (July 1995): 299–302.
[573] Jenny Kitzinger, 'The Methodology of Focus Groups: The Importance of Interaction between Research Participants', *Sociology of Health & Illness* 16, no. 1 (January 1994): 103–21.
[574] Kitzinger, 'Qualitative Research. Introducing Focus Groups.'
[575] Pearce et al., 'Communicating with the Public Following Radiological Terrorism'.
[576] Rogers, Amlôt, and Rubin, 'The Impact of Communication Materials'.
[577] Wray and Jupka, 'What Does the Public Want to Know in the Event of a Terrorist Attack Using Plague?'.
[578] Henderson et al., 'Chemical (VX) Terrorist Threat'.
[579] Wray et al., 'Communicating with the Public about Emerging Health Threats: Lessons from the Pre-Event Message Development Project'.

areas of interest of the present research.[580] [581] [582] The systematic literature review (Chapter 2) revealed that only two previous academic studies used focus groups to assess employees' willingness to work during a hypothetical serious incident.[583] [584] Consequently, due to this gap in the literature, this study used focus groups to examine the behavioural intentions (specifically willingness to work) and information needs of employees of different national infrastructure sectors to a hypothetical deliberate pneumonic plague release. Furthermore, this study is the first to include employees of national infrastructure sectors other than health.

The aims of this focus group study were to ascertain:

1. If employees will go to work in the event of a pneumonic plague outbreak.
2. How the level of information employees are given about a pneumonic plague outbreak influences their general thoughts and feelings about the event.
3. What barriers might employees face when deciding whether or not to return to work in the event of a pneumonic plague outbreak.
4. What factors might motivate employees to return to work in the event of pneumonic plague outbreak.
5. What information employees will want to know in the event of a pneumonic plague outbreak.
6. What the preferred information sources are for employees during a pneumonic plague outbreak.
7. What makes employees believe an organisation when they tell them it is safe to go back to work in the event of a pneumonic plague outbreak.
8. If staff reactions to a pneumonic plague outbreak vary by sector.

[580] Sandra Crouse Quinn, Tammy Thomas, and Carol McAllister, 'Postal Workers' Perspectives on Communication during the Anthrax Attack', *Biosecurity and Bioterrorism: Biodefense Strategy, Practice, and Science* 3, no. 3 (September 2005): 207–15.
[581] Janice C. Blanchard et al., 'In Their Own Words: Lessons Learned From Those Exposed to Anthrax', *American Journal of Public Health* 95, no. 3 (March 2005): 489–95.
[582] French, Sole, and Byers, 'A Comparison of Nurses' Needs/Concern'.
[583] Ives et al., 'Healthcare Workers' Attitudes to Working during Pandemic Influenza'.
[584] Smith et al., 'Paramedics' Perceptions of Risk and Willingness to Work during Disasters'.

Method

Design and procedure

In total eight focus groups (n=53) were conducted during November and December 2013. All focus groups took place at the participants' places of work, with two groups taking place outside of London and the rest conducted in London. Participants were recruited through gatekeepers at the organisations they worked for. The gatekeepers were either contacts of the funding organisation, the PhD advisory board or the supervisory team. Each participant was contacted by email to ask if they were interested in taking part and provided with the study information sheet, after which a meeting time and place were arranged. The focus groups lasted between one and a half and two hours and were audio-recorded. Participants signed a consent form to acknowledge that they understood they could withdraw from the study at any time and that their contribution would be anonymous. The study was approved by the KCL War Studies Group Research Ethics Panel (REP(WSG)/11/12-28).

The method was adapted from a method previously used by Rogers et al., in which members of the public were presented with a series of media injects containing information about a CBRN incident.[585] They were then asked to write down their first thoughts prior to discussions. Following this they were prompted to discuss their reactions and concerns, expectations of the authorities, behavioural intentions, information needs and preferred information sources with the other participants in the group. This method has been successfully applied to other studies, including the work of Pearce et al.[586]

To help participants visualise the scenario and to add a sense of reality to the focus groups, participants were presented with three injects. The first, a five minute video of a televised news broadcast was used to set the scene on the day the terrorist device was discovered. The second, a news website article was used to give more specific information about the incident and about pneumonic plague on day 5 of the scenario. Lastly, a social media page containing a series of posts from other users about the incident on day 16 of the scenario was used to gauge participants' feelings about the use of social media during an incident.

After being presented with each inject participants were asked to make some notes about their 'first thoughts' on a piece of paper before the group discussions began: 'What you might

[585] Rogers, Amlôt, and Rubin, 'The Impact of Communication Materials'.
[586] Pearce et al., 'Communicating with the Public Following Radiological Terrorism'.

be thinking', 'What you might be feeling', and 'Anything you might do'. These notes were used to capture the initial thoughts of participants, prior to discussion with other participants. This form of data capture enables the researchers to ascertain the extent to which discussion changes initial responses and gives a voice to participants who might be less forthcoming in group discussions. Following the written notes, the moderator prompted a group discussion using the pre-prepared semi-structured discussion guide, but also allowed participants to discuss topics not included in the guide. The discussion guide is presented in Appendix G. Prior to the start of the presentation of the scenario participants were required provide some demographic information and to identify their willingness to report to work in the event of a pneumonic plague incident ('willing', 'not willing' or 'not sure').

Participants

The participants were employees of organisations operating within the following sectors: energy (2 groups, n=13), finance (3 groups, n=19), Government (1 group, n=7) and health (2 groups, n=14). Participants had an average age of 34 and the male/female breakdown was 42% and 58% respectively. Participants with business continuity or crisis management roles were excluded.

Scenario development and inject design

The scenario used for the focus groups was a deliberate release of pneumonic plague at Victoria train station in central London. The scenario used in the focus groups was adapted (with the help of infectious disease modellers at Public Health England) from a scenario used in a Department of Health field exercise led by the Health Protection Agency's Centre for Emergency Preparedness and Response in 2009 ('Exercise Black Crocus'). It was also the same scenario used in a telephone survey study conducted by Rubin et al., which examined the perceptions and reactions of the public to the plague release.[587] For more details about the modelling data used to develop the scenario see Appendix E.

The scenario of a deliberate pneumonic plague release was selected for several reasons. Although CBR incidents are low-likelihood events, they have the potential to severely impact on UK national infrastructure, something that the UK Government's National Risk Register

[587] Rubin et al., 'Perceptions and Reactions with Regard to Pneumonic Plague'.

(NRR) acknowledges.[588] However the NRR does not distinguish between the different types of CBR incidents. A biological incident was selected for the focus group scenario as it has the potential to cause widespread consequences affecting all sectors of national infrastructure; an initially relatively small initial incident such as the release of an infectious disease could affect the entire country. It was decided that a covert biological incident would be interesting to study as it could potentially cause delayed symptoms and could cause long-term issues with regards to staff absenteeism. The willingness of staff to report to work in the event of a covert infectious disease release could be lower than other incidents such as chemical or radiological incidents as employees may be concerned that colleagues could have been infected and not yet know it.

Pneumonic plague was selected as the infectious disease used in the scenario due to the fact it is serious enough to potentially cause employees to be concerned about going to work (it is fatal if not treated) but could be effectively treated with antibiotics. Furthermore, in the web survey results discussed in Chapter 4, it was discovered that a pneumonic plague incident resulted in a very low percentage of employees being willing to work (24%). For a number of years the use of *Yersinia pestis*, the causative agent of plague, has been considered as a potential terrorist weapon, particularly in its aerosolised form. The methods needed to produce an aerosolised plague weapon have existed for many years; both the United States and Soviet Union's biological weapons programmes were involved in developing the techniques.[589] As a result, the scenario of an aerosolised plague attack has been used in past exercises and academic studies.[590] [591]

Focus group injects were developed to help set the scene of the deliberate pneumonic plague release and to help provide a sense of reality to participants by introducing new information over 3 stages (which represented 16 days of the scenario). The following three sections present a description of each stage of the scenario including the information given to participants.

Stage 1: The first inject presented during Stage 1 was a televised news broadcast. This inject was developed for a Home Office funded study conducted by King's College London and the

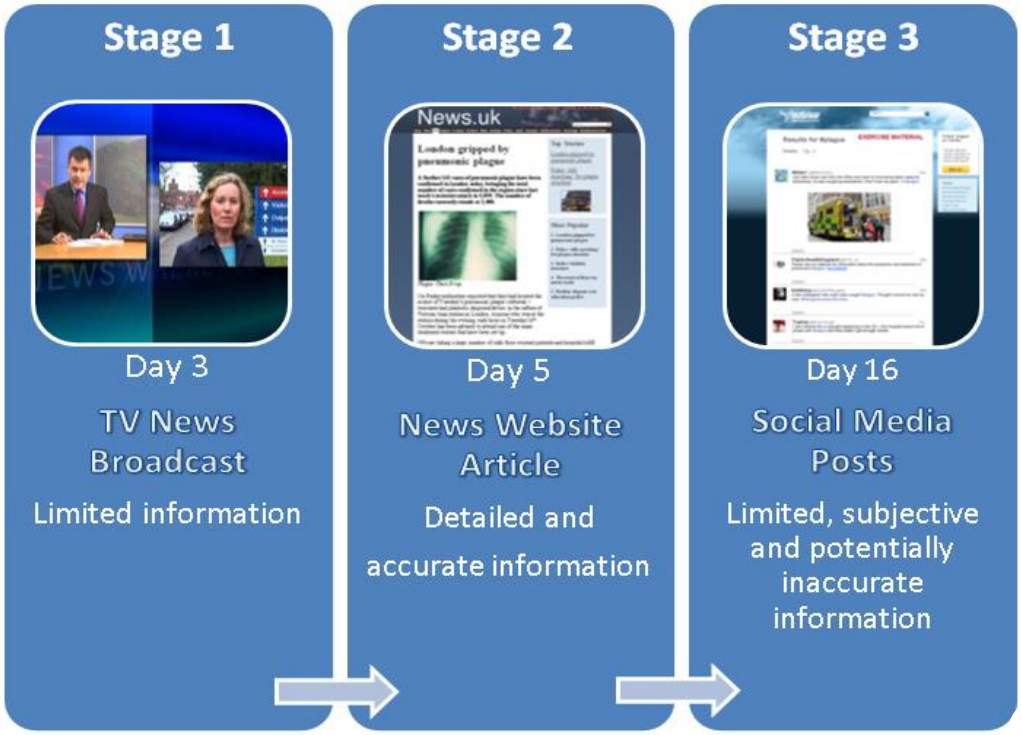
[588] United Kingdom. Cabinet Office, 'National Risk Register of Civil Emergencies'.
[589] Thomas V. Inglesby et al., 'Plague as a Biological Weapon : Medical and Public Health Management', *JAMA, the Journal of the American Medical Association* 283, no. 17 (2000): 2281–90.
[590] Thomas V. Inglesby, Rita Grossman, and Tara O'Toole, 'A Plague on Your City: Observations from TOPOFF', *Clinical Infectious Diseases* 32, no. 3 (January 2001): 436–45.
[591] G. James Rubin et al., 'Possible Public Responses to Pneumonic Plague. Unpublished Report.' (King's College London and the Health Protection Agency, April 2008).

Health Protection Agency in 2007. The news report takes place on day 3 of the hypothetical scenario, 2 days after terrorists planted a pneumonic plague dispersal device in the rafters of London Victoria train station. The news reporters informed viewers that authorities had discovered the device in the rafters, that there had been 100 cases in Kent alone and that anybody who thought they were at the station at the time mentioned should report to a mass-treatment centre. However, the main message given by the Health Protection Agency spokesperson was to carry on as usual.

Stage 2: The second inject takes place on day 5 of the scenario. A news website article informed participants that were 5,959 confirmed cases in the affected region and 1,408 deaths. In the article participants were given scientific information about the symptoms, incubation period, transmission and treatment of pneumonic plague. A key message of the article was that plague is fatal if not treated. Participants were again told to go to a mass-treatment centre if they had been at the station or in close contact with someone showing symptoms, and if not then to carry on as normal.

Stage 3: For the third and final stage, presented on day 16 of the scenario, participants were given a screenshot of a social media feed containing a number of posts. The first was a photo of someone being put into an ambulance and participants were asked to imagine the photo was showing the area outside their office building. Other posts contained opinions and concerns from other social media users (e.g. about the mass-treatment centres, the hospitals and schools). Participants were also told that the number of cases per day had significantly reduced by this point. Figure 5.1 provides a visual representation of the three stages of the scenario and the extent of the information provided at each stage is indicated. For full details of the scenario injects see Appendix F.

Figure 5.1 Stages of the focus group scenario (images reproduced with permission of Public Health England ©2015)



Focus group discussion guide

The focus group discussion guide was designed to cover a number of topics related to employees' thoughts and concerns about each inject, as well as their likely behaviour and expectations of their employer.

After watching the news report (Inject 1), participants were prompted to discuss: (i) their first reactions to seeing the news report at home in the evening; (ii) anything they might do; (iii) any further information they would require; (iv) whether they would follow the advice; and (v) their thoughts or concerns about going to work the next day. For the groups that were conducted outside of London, participants were asked to imagine the incident had occurred at a train station near them. Participants were first asked to imagine that they had been at the station at the time of the release and asked what they might do in this scenario. Following this they were asked to imagine that they had not been at the station and what they might do in that scenario.

After being presented with the news website article (Inject 2), participants were prompted to discuss: (i) their first reactions to reading the article; (ii) anything they might do; (iii) their thoughts about the messages in the article; (iv) any further information they would require; (v) their thoughts or concerns about going to work; (vi) what information and interventions they

would expect from their employer; and (vii) who they would want to hear the information from.

Finally, after being presented with the social media inject (Inject 3), participants were prompted to discuss: (i) their first reactions to reading the social media posts; (ii) their general thoughts about using social media during an incident; (iii) their thoughts or concerns about going to work; and if still to be discussed at this point, (iv) the interventions and information they would expect from their employer during this type of incident. For full details of the focus group discussion guide see Appendix G.

Analysis

All focus groups were audio-recorded, transcribed and subsequently analysed using thematic analysis. This was the method of analysis used for the interview analysis in Chapter 3. The transcripts were read and examined a number of times and the text was annotated with comments. The transcripts were then coded, and these codes collated and combined in order to form over-arching themes and sub-themes.[592]

Results

Participants were required to provide written responses to a number of questions at the start of each focus group (prior to the presentation of the scenario injects or the start of any group discussions), including demographic questions and a question asking if they would be willing to report to work in the event of a deliberate release of pneumonic plague. Table 5.1 presents reported levels of willingness to work separated into the different sectors.

Table 5.1 Percentage of participants willing to report to work in a pneumonic plague incident by sector

Sector	Percentage willing to report
Energy (n=13)	23.1%
Finance (n=19)	5.3%
Government (n=7)	42.9%
Health (n=14)	57.1%

[592] Braun and Clarke, 'Using Thematic Analysis in Psychology'.

Overall, participants revealed low levels of willingness to report to work in the event of a deliberate release of pneumonic plague. Clear variations in willingness were evident between sectors. For example, participants in the health groups reported the highest rates of willingness (57.1%) and the lowest rates were reported by employees from the financial services sector (5.3%). Qualitative analysis of the focus groups sheds some light on these reported trends.

Qualitative analysis of the focus groups

The following sections present the analysis of the focus group transcripts for each stage of the scenario, along with some examples of participants' first written responses after being presented with each inject.

Participants' 'first thoughts' at each stage of the scenario:

Stage 1: TV News Report (Day 3 of plague scenario):

At the first stage of the focus groups participants viewed the television news report (Inject 1), that set the scene for the scenario. The quotes presented here are from the 'first thoughts' participants noted on a piece of paper before the group discussions began. They were asked what they would have been 'thinking', 'feeling' and what they 'would do' if they had seen this report on the news.

Examples of participants' written responses:

> *The issue is worse than shown on news. The officials are quiet to stop panic. Concerned, people would panic. The fact that it is worldwide is very concerning. I would request to work from home, get tested and immunised.* [Participant 6, Group 5 – Finance]

> *Worried and anxious about my safety and alerting family and friends.* [Participant 2, Group 4 – Finance]

> *Stoical, the UK has suffered much worse. Unconcerned, as unlikely to have been affected.* [Participant 3, Group 3 – Energy]

> *Stay at home, not go back to work or allow boys to go to school. Watch out for symptoms and probably worry about the slightest cough. Log in to laptop and work from home if I need to work.* [Participant 3, Group 2 – Energy]

Analysis of the written responses of participants revealed variation in their likely thoughts, feelings and actions. In general, the 'first thoughts' noted down by the majority of participants contained reference to the concern they would be feeling at this time and their need for more information. However, there were also participants in each group who did not reveal much concern or thought the situation was being over-hyped by the media.

Stage 2: News Website Article (Day 5 of plague scenario):

At the second stage of the focus groups participants were given a news website article (Inject 2) to read, which contained information about the health effects of pneumonic plague and the current number of deaths (1,408).

Examples of participants' written responses:

> *Get me out of London! How can I get back to Wales without the train? If I stay at home for 4 days then I could get my folks to come and pick me up. After 4 days with no symptoms I should be ok.* [Participant 1, Group 1 – Finance]

> *These are large no's of cases and it is probably spreading now from infected people to others. They are being very clear about the seriousness of the situation.* [Participant 3, Group 8 – Health]

> *Shocked by number of deaths. Concern that it will rise further through contamination. Anger.* [Participant 5, Group 2 – Energy]

> *Not go to work. Work from own place even if management are adamant we come in! My health is more important than my job.* [Participant 7, Group 7 – Health]

As with Stage 1, the analysis of the participants' written responses revealed variation in their thoughts, feelings and actions. Overall, participants' 'first thoughts' after reading the article revealed a higher level of concern with more emotion revealed than in the first stage. Participants were more likely to reference their need to stay at home and had more specific information needs.

Stage 3: Social Media Inject (Day 16 of plague scenario):

In the final stage of the focus groups, participants were presented with a social media feed containing a series of posts from social media users.

Examples of participants' written responses:

> *Less of a panic now. People are being treated and it seems there's more control of the scenario.*[Participant 2, Group 4 – Finance]
>
> *Still wary. Will there be repeated attacks?* [Participant 1, Group 3 – Energy]
>
> *Concern that this is carrying on. Feels closer to home now, personalising the cases. Seems to be affecting all areas within society.* [Participant 7, Group 5 - Finance]
>
> *Nothing - go to work, help out with the situation and carry on with your daily routine.* [Participant 6, Group 7 – Health]

As with the previous two stages, the written responses of the participants at Stage 3 revealed variation in thoughts, feelings and actions. Overall, there was much less concern than had been evident in the first two stages. Participants were, in general, relieved that the situation was getting less serious and that they could now carry on as normal with less perceived risk to their health. However, there were still participants whose 'first thoughts' revealed some concerns and sometimes these concerns were not subsequently voiced during the group discussions.

Findings of the group discussions

The following section presents the findings of the analysis from the group verbal discussions during the focus groups. The analysis revealed 15 over-arching themes that are used to drive this discussion:

1. General reactions
2. Concerns
3. Behavioural responses
4. Information needs
5. Information sources
6. Perceptions of social media in general
7. Reactions to the social media posts
8. Knowledge/perceptions of a plague outbreak

9. Perceptions of the official/media response
10. General thoughts about going to work
11. Barriers to going to work
12. Facilitators/motivating factors for going to work
13. Expected response from organisation
14. Methods of organisational communication
15. Who/what would make employees believe it was safe to return

Each of these over-arching themes will be discussed in turn with supporting evidence from the relevant stages of the focus groups.

Theme 1: General reactions

At the first stage of the focus groups, the majority of participants across all the groups spoke of their anxiety and fear upon viewing the television news report, and a range of reactions were observed from being 'worried' and 'stressed' to feelings of 'panic' and 'dread'. An initial reaction for some participants was to leave London, for example as two employees of a financial services organisation discussed:

> ***[5]*** *I'd want to move back to Ireland straight away. I'd be gone.* ***[3]*** *Yeah, I'd think the same, how can I get back to Wales without going on the train.*
> [Group 1 - Finance]

By contrast, some participants expressed being underwhelmed by the news report. They believed that the situation did not sound that serious and suggested that it was probably being blown out of all proportion:

> ***[1]*** *I didn't get that 'oh my God I'm going to die' [feeling]. I didn't get that at all. I just thought 'ok there has been an attack, some people are sick, no one's died'. It didn't say anybody had died yet, there was no mass panic on there, and the media does tend to over-hype things so I would think that was so subdued that it probably wasn't that bad.* [Group 1 – Finance]

At the second stage of the focus groups, participants consistently across the groups described the situation as being more serious now than it was at Stage 1. They often described feelings of 'anxiousness', 'worry' and 'concern', as well as using words such as 'horrific', 'freaked-out' and 'panicking'. The main cause of the increased concern was the number of cases and particularly the number of deaths. Many participants went on to calculate the death or fatality rate as a percentage or fraction of the total number of cases and noted that this was very high:

> ***[6]*** *Horrified at the amount of innocent people that have died, it's a lot. The numbers… it's a warzone.* [Group 2 – Energy]
>
> ***[7]*** *I think I would be very concerned about the proportion of deaths; it seems to be over a fifth of people that have died. And the fact it keeps saying it is fatal for those who do not receive treatment in time, makes it sound like it isn't if you are old or frail, but if you don't get the antibiotics you are going to die.* [Group 5 – Finance]

A small number of participants said they would be relatively calm if they had not experienced any symptoms. However the majority of participants expressed feeling more anxious after finding out that pneumonic plague was fatal for those who did not receive treatment.

Overall, participants' discussions during Stage 3 revealed a perception that the situation was becoming less serious now and that the response must have been successful:

> ***[2]*** *The end is beginning to be in sight. It's all slowing down a bit.* ***[6]*** *Not as concerned as I was. Seems to be running its course.* [Group 2 - Energy]

Certain posts on the social media feed caused some participants to worry or made others feel annoyed because they did not trust social media. There was an assumption in a few groups that the public must be under-informed to be asking questions on social media and this made some participants angry.

Theme 2: Concerns

Initially, participants in all groups spoke of their concerns that they may have been at the station themselves or that they may have been in contact with someone else who had. The risk to family and friends was a frequently mentioned concern. Some participants were worried for the safety of those they knew who may have been near the station or worried about the risk of themselves infecting their loved ones, as one participant described:

> ***[3]*** *I think I'd be worried that there was still a chance that I could have it, because if I was on that train is there a chance I could still have symptoms? And should I stay away from my children because could I be giving it to them?* [Group 2 – Energy]

Those with children were particularly worried about the risk to them, specifically with regards to them going to school. Similarly, some participants mentioned having elderly or vulnerable adults at home who they could also put in danger. Some of the groups expressed concern about having been at the office for the last three days, which may have resulted in contact

with colleagues who had been through Victoria station on the release day. For example, one participant reminded another less concerned colleague of that issue:

> ***[3]*** *I don't think I would be stressed by it all. Being so far from it, with the family nowhere near it as well.* ***[1]*** *But you come here…where people from Victoria would have come.* [Group 4 – Finance]

Many groups spoke of their worry that there might be a secondary attack, that could either be a follow-up attack by the same people or a copycat attack and this was usually discussed in relation to using public transport to get to work.

Concerns were generally heightened at Stage 2, with participants being more worried about getting ill and needing treatment. They were concerned that they may be ill already but not yet showing symptoms, as one participant explained:

> ***[7]*** *And with the whole incubation period, but maybe I just don't know about it yet because cases are still being confirmed? So, I'd be feeling very anxious and worried.* [Group 5 – Finance]

Frequently mentioned concerns were that there might be insufficient supplies of antibiotics for everyone who might need treatment and that the mass-treatment centres might already be at full capacity. Participants were increasingly concerned about their families and some said they would want to get antibiotics for their loved ones as soon as possible, even if they were not ill. They were also worried about having already passed the infection on to their families because they had been at home for the last few days and they might not have known that they had it themselves. The reluctance to use public transport was even more evident in Stage 2; however participants were now more worried about catching the plague from a fellow passenger than they were about a secondary attack, as one participant described:

> ***[2]*** *…. I mean having a bomb on a train is one thing, but this is a bomb on every train potentially, if you've got a [fellow commuter] infected. And travelling in London at rush hour is dreadful.* [Group 8 – Health]

The risk of a secondary attack did still remain a concern for some participants who were concerned about a follow up attack because the perpetrators had not yet been caught. This concern was also evident amongst some participants during Stage 3 and in one group participants also mentioned still being concerned about catching the plague from fellow passengers, for example:

> ***[5]*** *I wouldn't want to use [public transport]… just because the cases that have arisen have resulted from public transport. So yeah, I wouldn't be using*

> *it…. **[7]** I guess you get copycat people, it could be done again. But I think I'd mainly be scared of catching it from someone.* [Group 3 – Energy]

Although there were fewer concerns discussed during the final stage of the focus groups, in two groups participants wondered if there were enough antibiotics for everyone and were still concerned about the mass-treatment centres being overrun by this point in the scenario.

Participants also discussed the potential societal impacts of the incident in all of the groups. In general it was assumed that there would be widespread disruption caused by an event of this scale, with empty supermarkets, rioting and looting, transport disruption and 'mass hysteria' mentioned. For example, one participant in a finance group said:

> ***[7]** Because I would imagine you would have mass hysteria. Supermarkets now would be completely empty.* [Group 1 – Finance]

Theme 3: Behavioural responses

At the first stage of the scenario participants discussed the mass-treatment centres and the discussions revealed some scepticism and reluctance to follow the official advice and attend a centre. Although there were participants in most groups who said they would go, others were hesitant and said they would wait for more information or wait to see if they would start experiencing symptoms. The main reason for not wanting to attend a mass-treatment centre was that it would increase their chances of catching the plague if they did not have it already. When asked if they would attend a mass-treatment centre as per the advice in the news report participants answered:

> ***[7]** Probably not actually. You're probably more like to catch it there than anywhere else. **[1]** Well that's true actually.* [Group 2 – Energy]

> ***[7]** I think I would probably be a bit sceptical about it, [because of] the number of people and whether you were more likely to come into contact with it, and you know, you're sort of throwing yourself back out there again.* [Group 3 – Energy]

Across the groups participants spoke of their intention to contact others after finding out about the plague outbreak. This included calling friends and families to reassure or to check on them or calling colleagues who might have more information. A minority mentioned contacting their GPs either for advice or to try and get an appointment; however others disagreed with this idea.

Participants discussed the perceived dangers of using public transport, with some saying they would avoid major train stations for fear of another attack and others saying they would change their route to avoid Victoria station, as this participant explained:

> ***[1]*** *Because of where I live I would probably still avoid Victoria station just to be on the safe side…I guess it wouldn't be much extra effort for me to say get a tube to Vauxhall and walk the rest of the way. Another ten minutes on my journey, just to avoid Victoria, because there could be another device hidden there that's going to go off.* [Group 7 – Health]

The only times participants spoke about wanting to use public transport were when they were discussing using it to leave London to go and stay elsewhere.

A number of participants across all groups said that they intended to isolate themselves at home so that they did not catch the plague from other people outside the home. However, there was also a desire to get antibiotics somehow before they isolated themselves. Some participants said they would prefer to get the antibiotics delivered to their home (as they had during the swine flu pandemic).

There was an increased desire a Stage 2, when compared to Stage 1, to 'get checked out' or to receive prophylaxis treatment. However, participants did not want to attend a mass-treatment centre and wanted antibiotics sent to their home. Again, participants wanted to source antibiotics as a preventative measure for themselves and their families, to take 'just in case', for example as one group discussed:

> ***5:*** *Yes I...I as I said I would want them even if no one is symptomatic at this stage, I would want [my children] to have antibiotics as well, I would be worried not only for me to have the disease but to take it home.* ***3:*** *But even when you're fine? So you're fine but you would give your child antibiotics?* ***5:*** *Yes, by this stage and looking at the figures I would be worried.* [Group 7 – Health]

There was no difference in the desire to get antibiotics as a precautionary measure between the groups from the health sector and the other groups, even though it was acknowledged that it might be going against the advice of their employer.

Participants often mentioned influencing the behaviour of their family members, either by encouraging family members to stay at home or stopping children going to school or nursery, for example:

> ***[4]*** *I certainly wouldn't be sending them to school or nursery.* ***[5]*** *No.* ***[4]*** *It'd be rife there….* ***[4]*** *I'd just want them to be enclosed as much as possible, they're not going out to parks, they're not going to soft play.* [Group 2 – Energy]

> ***[7]*** *Well one of [my children] works for [same employer] so he wouldn't be coming in. And my daughter's a teacher, so she wouldn't be going anywhere near the little oiks. No they would stay away. I'd pull them all back to my house and stay there.* [Group 1 – Finance]

> ***[7]****….if I didn't think I had come into contact with it and I thought I could help then I would. But I wouldn't let my husband, he would have to stay at home. Does that make sense?* [Group 8 – Health]

There were parents who made the decision to keep their children off school only at Stage 2 of the scenario and who said they would have been fine to let their children go to school at Stage 1.

At Stage 3, fewer participants spoke about their behavioural responses, most likely because there was a perception things were getting back to normal. However one participant mentioned still avoiding public transport after 16 days, even when a vaccine was offered as an incentive:

> ***[7]*** *I'd prefer them to give me the vaccine at home…I'd prefer not to travel on the train, if the trains were running.* [Group 1 – Finance]

In addition, two participants discussed how they would try to get antibiotics from an alternative location to the treatment centres or local NHS. For example, one suggested leaving London to go and visit a doctor:

> ***[1]*** *We've got shortages here [points to inject], so there would be people migrating from that part to other parts. Rather than going to your local doctor you'd go out into the country.* [Group 1 – Finance]

Theme 4: Information needs

Participants were asked if there was any information they still required after viewing the television news report. All groups discussed their need for more information as it was felt that the report was significantly lacking in specific details about pneumonic plague and practical information they could act on. For example:

> ***[5]*** *I'd want information on protection rather than cure, how can you protect yourself from catching it rather than about getting treatment if you actually have it.* ***[2]*** *Yeah exactly, how exactly is it transmitted and how do you stop that.* [Group 1 - Finance]

> ***[7]*** *And if there's like an incubation period where you can say ok I'll just stay in one room. Just other practical things so that people aren't running out there if they're infected.* [Group 3 – Energy]

In general, participants wanted information about what symptoms they should be looking out for, the duration of the incubation period and how easily plague was transmitted from person to person. Specifically participants wanted to know how they could protect themselves from catching it or avoid passing it on to significant others and whether or not it was possible to catch it from someone who was not yet showing symptoms. Participants also wanted to know about the effectiveness of antibiotics, whether or not antibiotics could protect an individual from catching the infection and if it was possible to catch the plague a second time after being treated. A few groups wanted to know what they should be doing and wanted more information about the mass-treatment centres. They also wanted to know if they should be going to their GP/A&E to get antibiotics and if they should be wearing masks. Other participants wondered if certain vulnerable groups were more susceptible to catching pneumonic plague or if they would experience more severe symptoms. A few groups expressed a need to find out how far the outbreak had spread so far, how many people were affected and the current location of the people who had caught it at the station.

During Stage 2 of the scenario, many of the questions participants had in Stage 1 had been answered by the second inject, the news website article. However, participants still required more detailed information about how pneumonic plague was transmitted. For example, one participant wanted to know if it was safe to kiss people or to shake hands with them, and another queried whether plague would stay on people's clothing. Other participants wanted to know if children were more susceptible to catching plague and if they would experience more severe symptoms. They also wondered if it was worse for people who did not have a good general level of health. There were still questions related to the use of antibiotics, as one participant queried:

> ***[5]****….can antibiotics prevent it as well as cure it? If you take the antibiotics does that give you some degree of resistance to it….* [Group 2 – Energy]

Participants in a few groups also wanted to know about the course of the illness; for example, after developing symptoms how long would it be until people died. They also queried if they

could wait until they experienced symptoms before they went to a mass-treatment centre or if that would be leaving it too late.

Theme 5: Information sources

After viewing the news report on the television, participants were asked what sources they would use to get more detailed information. All groups mentioned using the internet for this; more specifically by typing 'pneumonic plague' into Google , searching Wikipedia and using news websites such as the BBC. Others would look at the NHS website and some said they would call NHS Direct. In the health sector groups the CDC website was also mentioned as a good source of information. Watching '24 hour rolling news' and television news channels in general were discussed and one group suggested that local radio might be useful for local information. Two groups mentioned seeking out Government communications and that the Government may set up a new website containing information and updates about the situation.

All groups reported a lack of trust in certain information or information sources and specifically, the lack of information in the television news broadcast made participants suspicious. Some participants felt that information was being withheld from them on purpose and that maybe the situation was more serious than reported, as one employee of an energy sector organisation explained:

> ***[2]*** *They didn't actually say how many casualties there were, they avoided it completely, it didn't give rough estimates. So it might actually be more worrying than the [media] are leading you to believe because some of the facts are not there.* [Group 2 – Energy]

The BBC was mentioned as a trusted source, as was the NHS and Public Health England. However, some participants said they did not trust the doctor depicted in the report (named as Dr Ron Bowen from the Health Protection Agency) and did not feel confident in what he was saying. There was a perception among some groups that different news agencies may report differently. For example, the Daily Mail and Fox News were believed to cause panic as a result of the media's perceived tendency to 'over-hype' stories. Social media was mentioned as a useful way to find out the opinions of the general population and also a way of checking on friends and family. However, there were also issues raised about the inaccuracy of social media as a source of information, with some participants reporting that it could be a source of 'hysteria' and 'panic'.

Theme 6: Perceptions of social media in general

The general feeling of the majority of participants in the groups was that they did not trust social media. Firstly, participants thought that people can be prone to exaggeration when they are posting on social media. Secondly, they were concerned that people who simply do not know anything about a situation or topic will post something inaccurate. However, despite not trusting social media and thinking most of it was 'rubbish', there were a few participants in the groups who said that they would still look at it anyway. Particularly it was felt that it was useful to look at it during fast moving emergencies because you can see photos from people at the scene or see the general trends of public opinion. One participant said they knew it was not to be trusted but that it would be hard not to be affected by it:

> ***[7]*** *I do think as well that although you know it isn't to be trusted, it's quite hard to look at all of that and be like 'meh, these people must be over-reacting'. I think it almost personalises some of the cases, you start to think 'oh this is affecting people', and assuming that you might know some of the people if it's on your social media feed. So that might start to breed a bit of concern even if it is hysteria and scaremongering.* [Group 5 – Finance]

Some participants said they were more likely to trust a social media post if it was posted by someone they knew on their friends' list than if it was by complete strangers. However, it should be noted that often 'friends' on a social media friends' list are not close acquaintances. One participant commented that they would be inclined to believe things that their friends posted because although they might not trust the media's portrayal of a situation, it would be different if it was someone they knew posting about their own personal experiences.

Theme 7: Reactions to the social media posts

Despite the majority of participants indicating they did not trust social media and that most of the posts were just 'panic mongering' and by 'idiots', there were a number of participants who appeared to be affected by the posts in the inject presented during Stage 3. These participants noted that they would be likely to use social media during a real incident.

The first post in the social media inject was a photo depicting what participants were asked to imagine was the outside of their office. In front of the building was a man being put into an ambulance and the post stated that he had been 'coughing everywhere'. A small number of participants were affected by this, saying they would be worried about it if it was at their organisation or if a friend posted it:

> ***[4]*** *I think there would be a lot of people posting stuff on social media, including pictures, I expect there would be a load of pictures. I would probably be inclined to believe it, especially if my friends posted a picture of someone at work. I think that's when it starts to become real doesn't it.* [Group 8 – Health]

One participant said it might make her worried that it was happening all over again and another said:

> ***[5]*** *If they're trying to get us all to come back into work, then it's not the best advert for it.* [Group 8 – Health]

A different participant commented that they would be angry that someone had gone to work with symptoms and another said that if the photo was genuine it would mean nobody would come into the office after seeing it:

> ***[2]*** *But if this first post was actually at work, I don't think there would be anybody in the building after that. Because there's no way that the company is going to say 'yeah don't worry about that, come on in anyway'. Unless there was a massive doctors' surgery set up where they had vaccines or antibiotics ready for people to come in.* [Group 1 – Finance]

In contrast, other participants questioned whether the photo was genuine and suggested it might not even be from that day or it could be someone having a heart attack. A few participants said they would want confirmation from their organisation if this had genuinely happened and one participant said their employer would want to respond to the photo to reassure staff that their risk had not increased.

The social media inject also contained a post in which a user was complaining that people were not getting treated. After reading this, one participant queried why people were not getting treated as this was irresponsible. Furthermore, the post from a parent wondering whether it was safe to send her child back to school reinforced doubt in one participant:

> ***[4]*** *Well I think the concern is about these people who are still unsure about when it's safe to do things like go back to school. So you'd probably be wondering about when it is safe to go back to work.* [Group 4 – Finance]

Other participants were influenced by the post about mass-treatment centres being high-risk areas. When discussing the possibility of their employer providing vaccinations on site, two participants said:

> ***[2]*** *Especially if you don't have to go to that treatment centre that sounds like everybody's coughing and spluttering everywhere.* ***[1]*** *Germ pool, isn't it.*
> [Group 2 – Energy]

There was also a comment from one participant that although they were able to think rationally about it all during a hypothetical scenario, in a real incident they would be more likely to be influenced by social media.

Theme 8: Knowledge/perceptions of a plague outbreak

Participants in all groups reported low levels of knowledge about pneumonic plague. However, some participants from health organisations in groups 7 and 8 had slightly higher levels of knowledge about infectious diseases in general. For example, in group 7 there was a discussion about whether colleagues who had been at the station would have been infectious in the last three days or whether they had to be showing symptoms to be infectious:

> ***[3]*** *I don't know for pneumonic plague, but I mean usually after exposure you're not necessarily infectious. I don't know if you have to be symptomatic to be infectious.* ***[5]*** *I would have thought yes, but sometimes you don't.* ***[3]*** *But I know for measles you don't have to be. You can give other people measles before you get itchy.* ***[2]*** *14 days isn't it, incubation for measles?* [Group 7 - Health]

Due to the low levels of knowledge about pneumonic plague specifically, participants in all groups discussed their previous experiences of influenza pandemics, particularly swine flu. Some participants assumed this pneumonic plague outbreak was going to be similar to a flu pandemic. For example some participants believed that elderly people would react more severely to the disease:

> ***[4]*** *I would probably be more concerned for elderly family members and neighbours, who are more likely to react more severely to it.* [Group 6 – Government]

Other participants misunderstood the news report, that said that the plague was spread by coughing and sneezing and assumed that it was a mild illness with flu-like symptoms. They then filled in the gaps in the information with their own knowledge and perceptions, for example:

> ***[1]****It does seem odd that you've got a terrorist attack and yet your symptoms are fairly mild, coughing and sneezing.* ***[5]*** *Well they are trying to figure out how serious it is. If it's just coughing and whatever then it's not such a big deal.* ***[4]*** *I thought it just said it was spread by coughing and sneezing, which is why I said there wasn't much information about how the symptoms developed. I mean plague might start off like that but it certainly doesn't stay like that.* [Group 4 – Finance]

There were misconceptions about some of the scientific details of a pneumonic plague outbreak, for example that no individuals would have an incubation period of longer than 4 days. Furthermore, one participant from a health sector organisation was convinced that people with good immune systems would not be at risk of catching it:

> ***[2]*** *If you have a good immune system, then even if you come into contact with the person who's infected then you will not get the disease. But we should look whether they have any vulnerable adults or children living with the families, are they being affected at all? So if you have a good immune system then you can get through it without getting plague.* [Group 7 – Health]

Most participants appeared to assume that after receiving prophylaxis treatment they would no longer be at risk of catching plague again for a second time.

A further assumption raised in two group discussions was that the outbreak would only affect London and would not spread as far as the countryside after five days:

> ***[3]*** *Again with where we live it's out in the sticks, so it's unlikely the school would be closed, and the teachers all live locally, it's a very small school.* ***[Moderator]*** *So you are assuming this has stayed in London?* ***[3]*** *Yes.* [Group 4 – Finance].

Theme 9: Perceptions of the official/media response

There was a general lack of trust evident across all the group discussions with regards to the official advice to 'carry on as normal' featured in the television news broadcast. Participants often felt that there was a motive or agenda to the Government wanting the public to carry on as normal and others did not trust the HPA spokesperson featured in the news report:

> ***[6]*** *But it didn't sound to me like it was under control. I didn't trust the guy from the HPA saying you should carry on as normal. It would be nice to be able to carry on as normal and I understand you have to give the impression of things not affecting you, but surely practically….* ***[7]*** *That's what I'm saying… I'm surprised that would come from someone like that. Someone from the Government or the police would be saying carry on as normal, not someone from a health authority.* ***[6]*** *Yeah that seems strange.* [Group 1 – Finance]

> ***[7]*** *[The media's] approach would be 'everyone's going to die blah blah blah' and you need to give it a balanced view. That is propaganda almost, saying calm down don't worry about it. The cynic in me would say that they're not*

telling you the whole truth. ***[5]*** *Yeah who would you trust, what can you trust?* [Group 1 – Finance]

Despite the official message encouraging them to carry on as normal, many participants said they would not be doing this following the broadcast. One group discussed the fact that the official advice during bad weather is to only travel if you have to, therefore it was felt that the Government were downplaying the plague outbreak too much which would cause suspicion. In contrast, some participants wondered if the media were overhyping the situation and that it would turn out to be not that serious. One group discussed their views on this:

> ***[1]*** *I don't have a lot of faith in the media and the Government to tell us exactly what's going on.* ***[3]*** *I agree.* ***[4]*** *Well they don't want to cause panic do they.* ***[1]*** *They don't want to cause panic.* ***[3]*** *But they do also over-dramatise.* [Group 4 – Finance]

Furthermore, some participants reported feeling reassured by the fact the reporter was not wearing PPE standing next to Victoria station and by how calm Dr Ron Bowen appeared. Others suggested that the response of the authorities suggested they were expecting the situation to get worse:

> ***[1]*** *You know, if they're setting [treatment centres] up on MOD land they must be expecting it to overspill from the hospitals.* [Group 4 – Finance]

The report mentioned that there were '100 people in Kent alone' who had pneumonic plague, which was often misunderstood to be 100 cases in total and did not seem that serious to some participants.

Although participants were happy to receive more information during the second stage of the scenario, some participants recognised that people's behaviour before the full information is released could have serious consequences, as one explained to the rest of the group:

> ***[1]*** *You know what we're like, we all procrastinate until it's too late. You…. in the first report before anybody died…you were all talking about 'well as long as my family haven't got it then I'll just carry on like normal and think it's going to be fine, let's just wait and see what happens'. How do you know 1400 people didn't say 'let's see what happens?'* [Group 4 – Finance]

Participants across several groups were still annoyed at the advice to carry on as normal, particularly as the situation was perceived to be more serious than at Stage 1, and this was seen as irresponsible:

> ***[3]*** *I'm actually a bit annoyed at the advice to carry on as normal because you think that's just spreading the disease potentially, so why are they giving us this advice?* [Group 2 – Energy]

The message in the news website article of 'it's fatal for those who do not receive treatment in time' shocked participants; however, it was also seen as useful information because it would encourage people to seek treatment.

Theme 10: General thoughts about going to work

There were mixed views among participants about whether or not they would go to work the day after seeing the televised news broadcast. Some participants said they would go to work as the situation did not seem serious enough to warrant staying at home. Others reported that they would go to work because they did not feel at risk. For example, one participant said:

> ***[5]*** *I wouldn't be too worried, I take the bus and I don't usually enter the train station.* [Group 7 - Health]

Other participants said they would go to work unless they were specifically told to stay at home and would contact their employer first to find out what they should be doing. In spite of this, the majority of participants across all groups displayed a reluctance to go to work, with many saying they would rather work from home. Some participants also said they would not go to work but that they would not be able to work from home either as their job was something that could not be done at home. A number of participants said that work would not be their priority after seeing that news report. Furthermore, the majority of groups failed to discuss the subject of whether or not they would go to work unless specifically prompted by the moderator. The subsequent discussions among participants revealed their personal risk assessments, weighing up whether or not it was safe enough for them to consider going to work. For example, as one health sector group discussed:

> ***[1]*** *I would want to look at every journey and say what's the risk, and is it worth me taking that risk…. **[2]** I think it depends on your own opinion of what's important. There's a line that you will draw yourself as to what you would and wouldn't do for work. If in your own mind your employer's asking you to do something, to come into work, and you felt there's no way I'm going to do that because the risk is too great, and you wouldn't do it, simple as that. **[3]** I would feel I would have to come into work for the first couple of days to help out.* [Group 8 – Health]

However, the majority of participants did not seem to be facing a dilemma between their personal risk and their professional duty; the decision of whether or not they would go to work was quickly made and appeared instinctive. Very few participants changed their minds during the group discussions in Stage 1 or Stage 2. For example, as two employees of a Financial Services organisation discussed:

> ***[5]*** *Work would be the last thing on my list. I wouldn't log on, I wouldn't check to see what they are asking for, I probably wouldn't even care, because it's a job at the end of the day, my life is at risk. I wouldn't really care.* ***[7]*** *And that would be the approach for the vast majority of us I think.* [Group 1 – Finance]

Although many participants justified their decisions not to go to work with the fact they could just work from home, at least a quarter of these participants said that they might have left something in the office that they needed to be able to work remotely, for example their laptop.

During the second stage of the scenario there was an increased reluctance to work and the majority of participants said they would not go in to the office. However, there were a minority of participants (mostly in the government and health sector groups) who said they would report to work if they were asked to go in and were protected by their employer.

Some participants expected that contractors might be needed in order to keep the infrastructure running and that there might be an expectation for them to report to work:

> ***[3]*** *….everything we've had so far is 'carry on as normal', so there could be potential, certainly for some of the contract employees, for their employers to have a slightly different view [on the issue of losing their jobs if they didn't come in.* ***[5]*** *Ah, they would probably come in.* ***[3]*** *Yeah they would probably come in. I'm a contractor, but there would be certain companies, you know restaurant, IT, if the news information is that employees carry on as normal then the expectation for them would be to carry on as normal.* ***[1]*** *You would have to have the infrastructure working.* [Group 4 – Finance]

There were similar discussions around the expectations of critical workers to report to work and one group discussed whether or not they expected them to do this. Participants were also aware that providing a back-up site would not remove the risk in such a widespread incident. There was a dilemma indicated by some participants who felt that they may feel pressured to go in, but they might also be worried about the risk to themselves or others. One participant said that they might need to fight their corner in this sort of situation and insist on working from home.

In the final stage of the focus groups there was a general increase in willingness to go back to work, due to a perception that the situation was less serious now:

> ***[6]*** *Not as concerned as I was. Seems to be running its course.* [Group 2 – Energy]

However, some participants said that they would still be at home at this stage.

> ***[2]*** *Personally for me it would be my own peace of mind, that would be the big thing keeping me at home. Until I felt confident enough in what was going on, and what the news reports were saying. So that would be my feeling, to stay at home.* [Group 3 – Energy]

There was still a general feeling across the groups that it was up to the individual employee whether or not they would go into work; they would want to know the organisation's expectations but they also wanted them to take into account people's personal circumstances.

Theme 11: Barriers to going to work

Overall, the main barriers revealed by participants were concern about the risk to their own health and concern about the risk to their significant others' health. The concern for their own health was related to their fear of catching pneumonic plague from other commuters on their way to work and also catching it from colleagues, as one participant explained:

> ***[5]*** *I'd think about obviously a lot of colleagues go into and out of that station, so in terms of going into the office, I'd be a bit uncertain about that.* [Group 3 – Energy]

There were also worries about a potential secondary attack on public transport or in the area near their workplace, which was seen as a reason not to go to work.

Participants discussed the potential need to look after children or other family members if they were sick. Parents also mentioned wanting to keep their children off school, meaning they would have to stay at home to look after their children. For example, one participant commented:

> ***[4]*** *I think I'd be more worried about my children. It wouldn't necessarily be about me coming into work, it would be about putting my children into school, because I've got no idea where the other parents were the day before, the week before. So that would cause childcare issues, which could cause issues getting to work.* [Group 2 – Energy]

Others assumed the schools would be closed in this sort of scenario so they would have no choice but to stay at home and not go to work. Several participants said that family would come first in a situation like this.

Another barrier that came up in discussions was not having an important role in a crisis or just generally and it was also perceived by some that employers would not care about their normal work in this scenario. They thought it would be better to stay out the way as they would not be able to help, as one participant explained:

> ***[3]*** *I would stay home mainly because I know where we work, that nobody would care about the policies I worked on for a few days, because everybody would be more interested in responding to this crisis. So therefore I wouldn't feel like I could help at all so I would stay at home.…* [Group 6 – Government].

There were more discussions about the barriers participants might face when deciding whether or not to go to work at Stage 2 than at Stage 1, which was indicative of the situation getting worse. The perception that the situation was serious was related to participants' decisions not to go to work. The main barriers continued to be related to a fear for themselves and a fear for others. Participants across a number of groups indicated that their health would come first before their job. Some participants described a personal risk assessment they would do, and if they felt the risk to their health was too great they would not go in.

As with Stage 1, there were worries about using public transport to commute to and from work because of the risk of catching plague from other commuters. Some participants were increasingly concerned about infected passengers sneezing or coughing on them or that they might touch communal railings. They were also concerned about the sheer number of people they could be exposed to on their daily commute. The second most prominent barrier discussed was the concern about loved ones, and participants were mainly worried about catching something at work or during their commute and then going home and passing this on to their families, as one explained:

> ***[1]*** *If work asked me to come in…because I'm adamantly against it, but it's more for personal reasons. I know that if I caught anything and went home, my dad has a really low immune system and I don't want to pass that on, that would just be terrible. So I would tell work, and I would be quite adamant about it, I would expect them to understand.* [Group 6 – Government]

There was also a concern that if they had elderly parents or grandparents then there might be a feeling that they *should* stay home and look after them, a decision that had a level of guilt associated with it.

Being sent to a back-up site or alternative office location was suggested as a possible option the organisation might put forward; however, participants across the groups said this would not affect their decision to come into work or not. The reasons were because it still involved going on public transport, sometimes further than their normal office, or the situation could be even worse in the alternative location. Similarly, some participants said they would not want to expose themselves to people from a different office or they thought people in the alternative office would not want them turning up there if they were coming from a higher risk area.

Another barrier to coming into the office mentioned by quite a few groups was the fact that they could do their jobs at home (provided they had the equipment and connection), so when doing their personal risk assessment they decided it was not worth putting themselves at any risk by coming into the office when they could complete their work in isolation at home, as one participant mentioned:

> ***[3]*** *I think I would contact other people in my team, because for most of us there's no reason why we couldn't carry on working from home. So I don't think I'd come in.* [Group 3 – Energy]

Participants were also more likely to say they would not come into the office if they felt their role was not important in a crisis. Other participants said that they were not that important in the chain of command at their organisation so they would not go in, but that people higher up would probably be expected to go to work.

Theme 12: Facilitators/motivating factors for going to work

In addition to the potential barriers faced by employees, there were various motivating factors that may increase their willingness to report to work. After viewing the initial news report, one of the primary reasons participants across the groups felt they were happy to go to work was because they did not perceive the situation as serious enough to warrant staying at home:

> ***[5]*** *I think I would still go into work, it hasn't spread massively yet … Because if they've already contained it, it was found within a couple of hours, yeah my train line doesn't go through Victoria anyway so….* [Group 5 – Finance]

A few participants (the majority from the Government and Health organisations) said they would go to work if they could do something to help with the response or recovery:

> ***[1]*** *Also if we were doing something that could help, we would feel obliged to come in and contribute to that. To be part of the solution rather than the problem.* [Group 8 – Health]

This was a trend seen across the other stages of the scenario, even once the situation had become much more serious. Some participants in the health groups discussed the fact that because their roles were related to public health and this was a public health crisis they would feel a duty to go to work. Amongst those who said they were willing to go to work, many wanted information about what the organisation would be doing to protect them and specifically access to medication or vaccination, as one participant explained:

> ***[7]*** *Perhaps if they had something in place to make sure you were ok. Maybe if they tested you and treated you. Maybe some kind of monitoring system to make sure that you're alright, then that could be like an incentive to go to work.* [Group 8 – Health]

One participant in a health sector group said that they would come in in the early days of the response to do the lab work needed, but then once the important work had been done they would go home to look after their family. In general, participants in the Government and health groups displayed more willingness to work (if they could do something to help) than those in the finance and energy groups.

During the second stage of the scenario, a few participants spoke about the need to do their job. This was either for financial reasons, because 'life goes on', or because they needed to be in the office to be able to do their jobs, for example:

> ***[2]*** *The majority of us don't have to come into the office to do our jobs.* ***[4]*** *It does help though. It does make things a lot easier.…* ***[2]*** *The work doesn't stop, the work carries on. If you don't do it today then it will be piled up for next week and the following week after.* [Group 7 – Health]

Similarly, a small number of participants mentioned considering the fact that there might be a financial impact on the business at that point. However, these participants were more likely to perceive the situation as less serious and the risk to their life as less severe.

Participants across the groups consistently mentioned having access to antibiotics and discussed whether this was something their employer could provide. It was suggested by some that the office could become a treatment centre for employees to come in and get treated and that this would be an incentive to come in, particularly when people were reluctant to attend the mass-treatment centres or were worried about a shortage of NHS antibiotics, as discussed in one group:

> ***[5]*** *That would actually be an incentive to come into work instead of working from home, if they said we could cut you out of the public queue.* ***[4]*** *Yeah if they said you could get your antibiotics here.* ***[1]*** *If we could turn into a treatment centre for the staff, that would be ideal.* ***[5]*** *Yeah because then you'd just….* ***[1]*** *You'd come to work and get treated as well, you'd be double secure.* [Group 4 - Finance]

In the Health sector groups, participants also mentioned that their employer could provide diagnostic testing (if it were possible for plague) to tell people whether they had the plague already, and that this would reassure people that others they were working with did not pose a risk. Participants across all the groups wanted their organisation to introduce preventative measures in the workplace to reduce the risk of the infection spreading between staff members. Interventions mentioned were: PPE, hand gels, encouraging hand washing and facemasks. Some participants also mentioned that they would be more likely to come into work if they were provided with accommodation so that they did not have to go home in the evenings and risk infecting their families, for example:

> ***[7]*** *If things were really that bad I don't think I would want to go home to spread it to my family, I would probably want a little room at work to stay over in, if you were really critical. I would want to stay here rather than risk spreading it. [Group 8 – Health]*

Not having to use public transport was also given as a potential motivating factor for going into the office. Similarly, the organisation providing assistance with transport or advice on the precautions they could take was considered a motivating factor. If asked to go to a back-up site or alternative location then some participants wanted reassurance that it was safe for them to go and information about what interventions were being provided at this new location.

Several participants across the groups said they would want to be provided information on the number of cases in the teams because if they knew nobody at their usual location had the disease they would feel reassured enough to go in. One participant suggested that people could report into a central database to say if they had been infected or if they had been in contact with anyone who had, and this information could be shared in an anonymised form.

Theme 13: Expected response from organisation

The analysis revealed that employees had a number of expectations of their employer in the event of a pneumonic plague outbreak. The majority of participants across the groups assumed their employer would be in contact with them almost immediately if it were a serious

incident. They also expected regular updates throughout the incident with specific advice and guidance, which was seen as useful, as one participant commented:

> ***[4]*** *….the more you know, the more you are going to be willing to come to work and the more you are going to be willing to commute and move around. So I think it's really important for the employer to give as much information as soon as possible.* [Group 8 – Health]

There was a need for clear, concise information about exactly what to do with regards to working from home and also reassurance. Participants expected their organisation to be taking this very seriously because it was a terrorist attack but also because of the number of deaths revealed at the second stage. There were mixed views among participants about what they thought their organisation would be saying to them in this scenario, with some expecting a 'carry on as normal unless you are ill' message. However, the majority of participants believed their organisation would tell their employees to work from home unless they were considered 'business critical' staff. This was only different in the groups from the health sector who believed they would be asked to come in to help with the response.

There were discussions about what the organisation would do if an individual said they did not want to come in because they were worried about the situation. Some participants thought the organisation or individual line managers would be unsympathetic, whereas others said they did not think the organisation could or would do anything in that situation, as it was their personal choice whether or not to come in:

> ***[3]*** *But they can't say nobody come to work, they physically can't say that. Just as they equally can't say yeah you've all got to come to work. They can only guide in what you want to do, in this sort of situation. They can't tell you what to do.* ***[4]*** *No.* ***[3]*** *They can only give you guidance, and it's your choice at the end of the day whether you follow that guidance or whether you say no I'm staying at home.* [Group 4 – Finance]

Participants across the groups wanted information from their employer about the organisation's long-term recovery plan or the plan for a situation where things could get worse. They wanted to know how the organisation was going to continue to provide its services and if there was a plan to get people back to work. Some participants said they expected their organisation had prepared for this type of incident and also would have a contingency plan if critical workers were not willing to go into the office. For those that might have left their laptops in the office, one participant made a suggestion:

> ***[7]*** *I don't think anybody would come in to get anything, if push came to shove it could be couriered out to you so you could still work.* [Group 1 – Finance]

There was a view in many of the groups that their employer would be in a position to provide antibiotics or vaccinations to their staff and there were discussions surrounding whether critical workers would get these first. As previously mentioned, some participants thought that the organisation would set up a treatment centre in the office or a treatment stand at an alternative location where members of staff could go and get antibiotics. However, some participants wanted these to be delivered to their houses so they did not have to put themselves at risk by going outside. Participants' expectations were sometimes related to past experience of flu vaccinations or their employer purchasing antivirals:

> ***[5]*** *I would think that [organisation's name] would actually have sorted something out. Because as permanent employees we have healthcare, we have health cover on our benefits, so I hope they would've sorted something out so that we could go there instead of going to the public NHS.* ***[4]*** *They could give antibiotics.* ***[5]*** *Yeah something like that.* ***[1]*** *They did flu shots.* ***[5]*** *So maybe someone coming round the building and giving us the equivalent of a flu shot or something.* [Group 4 – Finance]

Furthermore, one group discussed how their employer probably already had quantities of antibiotics in storage for use in a scenario like this one.

> ***[2]*** *A bank I think could get [antibiotics].* ***[7]*** *I think you'll find they've probably already got them.* ***[3]*** *Maybe they've already got them yeah.* [Group 1 – Finance]

At the final stage of the scenario much of the discussion was related to what an employer would do if the staff members had pneumonic plague. There was a general assumption across the groups that if an employee came into the office showing symptoms of plague that they would be sent home. Some participants were unsure about how exactly this would happen, but were sure it would. One participant thought it was likely that peer pressure would force the sick employee home before the organisation had them removed and, similarly, another participant said they would still be wary that colleagues could have pneumonic plague:

> ***[7]*** *You would definitely be on edge of anyone coughing anywhere near you in your workplace. You'd be like 'get yourself to a treatment centre.'* [Group 6 – Government]

Participants in a few groups said they would want to know what procedures their employer had in place to deal with staff members who were sick, for example contact-tracing, quarantining individuals or sending them for treatment.

Theme 14: Methods of organisational communication

Participants were asked how their organisation would communicate with them during this type of incident. Most groups mentioned expecting emails or texts from their employer or having a staff information telephone line they could call to see if they were expected to come to work. Most expected a mass-broadcast of information at this stage rather than targeted communication:

> ***[1]*** *There would be an email but it would also have phone numbers in it as well. There's a business continuity line and all sorts of things like that so that would have all the latest updates on what to do, and who to go to, and where to go to find more information.* [Group 3 – Energy]

> ***[2]*** *I would expect probably a text alert or an email at least.* [Group 5 – Finance]

In the Government group, the participants said they would expect an email telling them what was expected of them or for information to be put on the staff intranet. However, they also acknowledged that they might not have their laptops with them and were unsure if their employer had their personal contact details to be able to contact them in this sort of situation, as one employee explained:

> ***[4]*** *Yeah I'd just go on the gov.uk website, and I'd call the line, we've been given a number of emergencies. But yeah I think in terms of email, I don't think they've got my personal email and always keep my laptop at work and don't have a work Blackberry, so they wouldn't be able to contact me directly, I think I would have to look for the information.* [Group 6 – Government]

Theme 15: Who/what would make employees believe it was safe to return

If a message was sent to staff telling them it was safe to return to the office, then participants across the groups expected to hear this from a range of sources. Some expected it to come from the CEO, others a group wide text, some wanted to hear it from someone senior and then also someone in their team that they knew personally (i.e. their line manager). If a line manager was the person telling them it was safe to go to work then participants said they

wanted to see how this message had been passed down from the CEO, as two groups discussed:

> ***[4]*** *I would want to hear from someone fairly senior. But then I would also want to hear it from someone in our team, because you'd think if they are too senior then they might be saying official lines that are maybe not so accurate. So I would also want someone who was low down enough that you know they wouldn't lie to you. I'd want both.* ***[7]*** *If the person who told me I needed to come to work was my line manager, and it was because they had been told through a chain of command, and if I could see the chain of command and I could understand how that had been passed through, and knew the message I was receiving was an accurate one… then yeah I would want to hear it from my line manager.* [Group 6 – Government].

> ***[6]*** *I don't mind how it's transmitted, but I want it to have credibility. So it needs to come from the top, even if it's transmitted by my boss, I need to know it's not him deciding, that it's come from a higher level.* [Group 1 – Finance]

It was important to some participants that the person who told them it was safe to go to work was someone they knew. This was because this individual would have to tell them which specific tasks would be working on if they did go in, so they could judge the importance of these tasks and if it was worth the risk of them travelling into the office. Although some participants said they would want to see managers in the office before they went in, others said this would not affect their decision. Participants in one of the energy groups and both health groups suggested that they would be relatively trusting of what their organisation would tell them because they believed their employers to be very safety conscious, as one Energy group discussed:

> ***[7]*** *….in terms of my employer I would be reasonably trusting of what they told me in this case.* ***[3]*** *I think they would be unlikely to put out a message saying you must come into work. It would be quite the opposite. They're quite risk averse.* ***[2]*** *Yeah.* ***[1]*** *Yeah.* ***[3]*** *They're more likely to say stay at home because you don't want to infect the entire workforce.* [Group 2 – Energy]

If they were told go into the office, participants often wanted to be given specific reasons for this and for the organisation to explain how they were putting their safety first, as one employee explained:

> ***[7]*** *And if they did want us to come into work, that they gave us really good reasons, and throughout the whole process were putting our safety first. If at any point I felt that they were asking me to come in and didn't have a*

particularly good reason, and weren't necessarily putting my safety first then I would definitely not come in.[Group 6 – Government]

Some other participants said they would question the motivation of an organisation that asked its employees to go to work during such a serious incident and would wonder whether they were putting business above the safety of staff. Participants in one group discussed how annoyed they would be with a 'come to work if you think you can' message and felt that this was irresponsible. There was a general requirement for a good communication system to make sure staff have up-to-date information on which to base their decision and one participant said that the more confident they felt in the system the more likely they would be to come in.

Discussion

This focus group study has revealed that employees are likely to be reluctant to report to work in the event of a deliberate release of pneumonic plague due to a variety of potential barriers. However, several motivating factors that could encourage staff to report to work were also identified. At Stage 1 of the scenario there were mixed views about going to work, usually related to the perceived seriousness of the situation. The willingness of employees to go to work then reduced at Stage 2, when the full gravity of the situation was revealed and the number of confirmed cases and deaths was in the thousands. During Stage 3, participants' willingness to report to work increased when the numbers of cases had reduced and the situation was perceived to be more under control.

Across all focus groups, participants described the fear and anxiety they would feel during a pneumonic plague release. It is unsurprising that participants experienced fear during this scenario as past research into public risk perception has discussed the incidents the public fear most as ones that are unfamiliar, have serious consequences, have delayed effects, are uncontrollable and cause feelings of 'dread'.[593] [594] [595] A deliberate pneumonic plague release would score highly on all these qualitative attributes. The fear amongst participants was evident even before the information in the scenario revealed that the disease was fatal if not treated, and then increased significantly once that fact was known. This finding is similar to that of Glik et al., who reported that in their focus groups, after the first presentation of the

[593] Paul Slovic, 'Perception of Risk', *Science* 236, no. 4799 (April 1987): 280–85.
[594] Fischhoff et al., 'How Safe Is Safe Enough?'.
[595] Rogers et al., 'Mediating the Social and Psychological Impacts of Terrorist Attacks'.

botulism scenario, a range of emotional responses were voiced by participants such as fear, anxiety and distress.[596] When the scenario worsened and the participants were given more information, it was reported that their fear appeared to intensify and the information was deemed inadequate.

This perception of a lack of information was also evident in this focus group study, particularly at Stage 1 where the lack of information caused significant levels of distrust among participants and led to them questioning the potential reasons (or 'agenda') for the Government withholding information. Rogers et al. recommend that when not yet in possession of all the facts, it is better for authorities to communicate that they do not have all the information and to say 'I don't know', than to provide false reassurances.[597] Organisations should therefore send out a holding statement in the event of a serious incident. The statement should say that an incident has occurred, that the organisation does not have all the facts at this time, however the response protocol of the organisation has been initiated and an update will be sent to employees as soon as more information is known.

Past research has examined the potential behavioural responses of the public in the event of serious incidents such as those with a CBRN element. A study by Glik et al. reported findings from a series of focus groups examining public reactions to a hypothetical terrorist attack using botulinum toxin and discovered that the majority of participants said they would stock up on supplies such as food, water, and first aid supplies.[598] This is a finding supported by the present focus group study, with some participants saying they would go to the supermarket to get food or that they would try to purchase protective masks. Glik et al. note that the implication of this behavioural response was that the participants in their study were preparing to stay in their homes by stocking up on these supplies. However, it is also conceivable that the participants were simply concerned about supplies running out, which is a possibility given the fact that some participants in the present study mentioned that they expected empty shelves in supermarkets due to 'panic buying' and also the potential for looting to take place. Other participants in Glik et al.'s study said they would try to find a way to leave the area. Many said they would seek up-to-date information and others said they would contact family members to make sure they were safe. These are also findings supported by the present study, in which finding out information using the internet or contacting friends and family to check on their safety were top priorities immediately after hearing about the incident.

[596] Glik et al., 'Public Perceptions and Risk Communications for Botulism'.
[597] Rogers et al., 'Mediating the Social and Psychological Impacts of Terrorist Attacks'.
[598] Glik et al., 'Public Perceptions and Risk Communications for Botulism'.

One of the most prominent concerns as the situation developed was for the health of the participants' friends and families - their significant others. Participants often mentioned their need to make contact with their significant others, either to find out if they were safe and well or to reassure them with regards to their own state of health. Some also mentioned influencing the behaviour of other family members by encouraging them not to go to work or by keeping them away from school/nursery. Others mentioned staying at home to look after sick relatives or not going to work due to the risk of catching the plague themselves and going home and infecting their families. These findings provide support for Killian's theory of 'role conflict' in disaster.[599] Killian suggested that during a disaster, individuals would be faced with a conflict between their role in their family and their role in an organisation. Killian noted that in a disaster situation this conflict could be resolved in favour of loyalty to the family. This would explain the frequently discussed opinion in these focus groups that family would come before a job.

The present study's findings regarding the potential influence of significant others are also supported by previous research with healthcare workers, such as one study comparing nurses' needs and concerns with hospital disaster plans following Hurricane Floyd in Florida.[600] The most prominent concerns reported by nurses were family safety, pet care and personal safety while at work, followed by provision of basic needs such as food, water, sleep, shelter and rest. The fact that family safety came before the provision of food and water in people's mind shows what a significant influence it is likely to be. Furthermore, a focus group study of healthcare workers in the UK conducted by Ives et al. revealed that childcare could either be a barrier to ability or willingness.[601] The authors discussed the idea that some employees might not be able to go to work during an influenza pandemic as they have to look after their children when there is no other childcare, whereas others might not be willing to go to work because they would choose to look after their children themselves rather than rely on others to do so for them. This is also more likely to be the case if their children were ill as a result of the incident as parents could decide they would feel too guilty if they went to work and left their sick child at home being looked after by others, and therefore would be unwilling to go to work.

Due to these results, it is recommended that employers take into account this potential influence on their employees' decisions regarding reporting to work. They may also need to

[599] Killian, 'The Significance of Multiple-Group Membership in Disaster'.
[600] French, Sole, and Byers, 'A Comparison of Nurses' Needs/Concern'.
[601] Ives et al., 'Healthcare Workers' Attitudes to Working during Pandemic Influenza'.

allow employees time during their working days to contact their significant others and let them know they are safe, or to enquire about the health of their children. If they cannot do this then they may not be able to focus on their work. Organisations could also consider implementing more flexible working from home arrangements during a serious incident and allow staff to work from home whilst taking care of sick family members. For infectious disease outbreaks it might be necessary to provide accommodation for essential staff who are required to come into the office, so that they do not have to worry about going home after work and spreading the infection to their children.

The perceived importance of an employee's role in the response of the organisation is something that the present study has revealed to be an influential factor on their willingness to report to work in the event of a deliberate release of pneumonic plague. This is a finding supported by previous research such as Balicer et al., who reported that a significant predictor of hospital workers' willingness to respond to a radiological event was the perceived high impact of their individual response.[602] Similarly, Goodhue et al. reported that the most significant factor predicting the willingness of paediatric nurse practitioners to respond in a disaster was having a specified role in the workplace disaster plan.[603] In the present study's focus groups, several employees in the health and Government groups expressed a sense of duty. Some participants, particularly in the health groups, discussed the fact that they would be expected to come to work during a public health incident; something that was not discussed in the finance and energy groups (with the exception of one participant). This is a finding supported by Ives et al.'s focus group study of healthcare workers, which reported that participants discussed a sense of professional obligation to work during difficult or even dangerous situations.[604] The researchers noted that this was especially prominent amongst doctors and less so amongst nurses and ancillary staff. Therefore, the specific role of an employee is likely have an influence on willingness as well as the sector.

Ives et al. also found that participants often spoke of a 'duty to help', and that this was sometimes because they perceived themselves to have specific skills making them more useful than others, meaning they would have a special responsibility where others might not.[605] These findings may provide some explanation for the results of the written questions given to participants at the beginning of the focus groups which revealed that the percentage of

[602] Balicer et al., 'Characterizing Hospital Workers' Willingness to Respond to a Radiological Event'.
[603] Goodhue et al., 'Willingness to Respond in a Disaster'.
[604] Ives et al., 'Healthcare Workers' Attitudes to Working during Pandemic Influenza'.
[605] Ibid.

employees willing to report to work in the event of a deliberate release of pneumonic plague varied by sector; with 57% of health sector employees, 43% of Government employees, 23% of energy employees and just 5% of financial services employees reporting being willing to work. Therefore, it is possible that perceived importance of an individual's role, or the role their organisation has in the response, may be mediating factors on the influence of national infrastructure sector on employees' willingness to report to work during an extreme event.

The findings of this study also provide some support for Witte's Extended Parallel Process Model (EPPM), a model which previous academic researchers have found to be useful in understanding how healthcare providers' perceptions of threat and efficacy may influence their willingness to work during an influenza pandemic.[606] [607] [608] [609] The model suggests that when individuals perceive a threat they assess the 'perceived severity', which is their belief about the seriousness of the threat and the 'perceived susceptibility', which is their belief about their own chances of experiencing the threat.[610] The efficacy part of the model is separated into 'perceived response efficacy', which is the individual's belief as to whether the response can prevent the threat, and 'perceived self-efficacy', which is their belief in their own ability to perform the recommended response. The present study revealed that threat perception has an influence over employees' willingness to work, as those employees who did not think that the pneumonic plague scenario was a very serious incident or who thought that they were not susceptible to it (for example if they did not use public transport to get to work) were more likely to be willing to report to work. With regards to response efficacy, those employees who felt that antibiotics were going to protect them from catching the plague or would successfully treat them and who thought that their employer could keep them safe were more willing to work.

The influence of the self-efficacy component of the original EPPM was less obvious, as participants were often unsure where and how they would get antibiotics (from the NHS or their employer). However, none of the participants reported that they would be unable to take the medication if they were able to get hold of it. As in the web survey findings (reported in Chapter 3), a feature of efficacy not included in the original model but that was a clear finding

[606] Witte, 'Putting the Fear Back into Fear Appeals'.
[607] Barnett et al., 'Assessment of Local Public Health Workers' Willingness to Respond to Pandemic Influenza'.
[608] Balicer et al., 'Characterizing Hospital Workers' Willingness to Report to Duty in an Influenza Pandemic'.
[609] Barnett et al., 'Gauging U.S. Emergency Medical Services Workers' Willingness to Respond to Pandemic Influenza'.
[610] Witte, 'Putting the Fear Back into Fear Appeals'.

of the present study and of Barnett et al., was that employees' perceived importance of their role either in response or recovery, and the feeling that they would come to work if they could do something to help, was an influence on their willingness to work.[611] Similarly, Balicer et al. surveyed local public health workers in the US and their willingness to work during a pandemic and found that the most influential factor on their willingness was their perception of the importance of their role in the agency's overall response.[612]

An efficacy finding which is unique to the present study is that there was evidence amongst employees in the health and Government groups that their organisation needed to continue to function in order to help the country respond to and recover from this incident. This perception among employees who work in the health and Government sectors, that there were wider implications to staff reporting to work in terms of keeping the country running, is a new feature of the efficacy variable in the EPPM and as such warrants further investigation in future research studies (other suggestions for future research studies are presented in Chapter 6).

It was interesting to note that this acknowledgement of being part of national infrastructure and part of the country's response to the outbreak was not evident at all in the finance groups. During these groups was no evidence of a perception that their organisations needed to continue to function so that the country's financial transactions continued. The issue was raised in the energy groups, with regards to the need to 'keep the lights on'; however this was discussed in relation to the requirement for other essential/critical members of staff to be at work, and did not appear to be an influence on their own willingness to report. Therefore, it is possible that this perception that the recovery of their organisation is important for the UK as a whole varies by sector and potentially, by role. As such, employees who work for national infrastructure organisations that would not be as visible in the response to a public health event may need to be told the importance of their organisation continuing to function during a serious incident, and how they as individuals can contribute to that by going to work.

One of the key topics of discussion in the present study's focus groups was the provision of information. This was related to both the information that would be required from the Government or public health organisations and the information and advice that would be expected from people's employers. Specifically, accurate scientific health information containing facts and figures was required, containing details about symptoms, modes of

[611] Barnett et al., 'Assessment of Local Public Health Workers' Willingness to Respond to Pandemic Influenza'.
[612] Balicer et al., 'Local Public Health Workers' Perceptions'.

transmission, the effectiveness of medical treatment and the numbers of cases in specific regions. This is a finding supported by Wray and Jupka who conducted focus groups with the public to assess their information needs during a hypothetical plague attack.[613] The study found that that the public wanted answers to very specific questions such as: how to detect exposure; how to seek treatment; the nature of the threat; and what protective steps they could take to prevent transmission. It is vital, therefore, that communication in an infectious disease outbreak contains very specific information and is published as soon as possible in order for the public to take the recommended protective actions and help prevent the onward transmission of the disease. This type of information is likely to be provided by Government public health officials.

With regards to information from their employer, staff in the present study wanted advice about whether they should go to work or stay at home and information about how exactly their employer would be protecting them if they did go to work. As previously mentioned, information that was deemed to be inadequate was a significant concern for participants and this led to them turning to Google, 24 hour news channels or to social media in order to fill in the gaps. Additionally, the 'carry on as normal' message caused some individuals to question the agenda of the Government and made others angry. Rogers, Amlôt and Rubin's focus group study revealed that the provision of information increased the intention of the public to comply with official advice and also increased the perceived credibility of the messages given out by authorities for a hypothetical terrorist attack involving a radiological dispersal device.[614] The authors also note, however, that simple reassurance may not increase compliance with official guidance. Therefore, it is vital that both the Government and employers provide as much information as possible and do not simply rely on reassurance or 'keep calm and carry on' type statements. In terms of who people will want to hear this information from, the present study revealed that employees wanted to hear from health experts, both internal and external to their organisations. This is a finding that does not solely apply to biological incidents, with one study reporting that the public wanted to receive information during a VX incident from content experts on chemical attacks or from a well-respected public figure.[615]

A further finding of this focus group study is that participants' lack of knowledge about pneumonic plague, misperceptions of the response or misconceptions related to the

[613] Wray and Jupka, 'What Does the Public Want to Know in the Event of a Terrorist Attack Using Plague?'.
[614] Rogers, Amlôt, and Rubin, 'The Impact of Communication Materials'.
[615] Henderson et al., 'Chemical (VX) Terrorist Threat'.

information they received, led to inaccurate assumptions about the seriousness of the situation. During a real incident these inaccurate assumptions due to ineffective risk communication have the potential to lead to an over-response or an under-response on the part of employees, which could have serious consequences for the management of the incident.[616] These misperceptions could also have an impact on employees' decisions about reporting to work. For example, if employees perceive the incident to be less serious than it is, they may report to work and not take the recommended protective actions and thus risk further spreading an infection. If they perceive the incident to be more serious than it actually is they may refuse to report to work and organisations and UK national infrastructure may be severely impacted unnecessarily.

For the pneumonic plague scenario used in this study, some participants were underwhelmed by the media report due to the fact they had not witnessed any 'mass panic'; the spokesperson seemed very calm, no deaths had been reported, and the journalist was not wearing any PPE. These misperceptions led to some participants believing that the situation was being over-hyped due to media scaremongering and as such they would not change their behaviour or go to a mass-treatment centre. These findings of a potential under-response caused by misperceptions are supported by Pearce et al., who in their study of public responses to a hypothetical RED incident, found that participants were falsely reassured by the response of the authorities because they believed they would be quarantined or there would be a larger police cordon area if there was really a risk of radiation.[617] This assumption caused them to believe it was a 'scare story', which led to the majority of participants commenting that they would not change their behaviour.

In contrast, some participants in the present study thought that because the media report was 'very calm' and the Government advice was to 'carry on as normal', it therefore meant that the situation was in fact more serious than the report was suggesting. They believed that the Government wanted the public to carry on as normal simply because they did not want to cause widespread panic. These results show the importance of using effective risk communication to provide accurate information of the true seriousness of the situation, and to explain the reasons for any potential inconsistencies between the public's perception of an incident and the actual response. This could help avoid a situation in which the under- or over-response of the public causes unnecessary consequences, both for the incident response and for the recovery of organisations. Furthermore, Wray and Jupka, in their study of public

[616] Rogers and Pearce, 'Risk Communication, Risk Perception and Behavior'.
[617] Pearce et al., 'Communicating with the Public Following Radiological Terrorism'.

information needs to a hypothetical plague attack, recommend that government messages should reflect full disclosure and openness.[618]

In addition to accurate communication, the provision of medication during an infectious disease outbreak (or other such incident requiring treatment or vaccination) was an intervention deemed to be important by many of the participants in the present study. A number of previous academic studies have found that being provided with vaccination, medication and/or protective equipment was associated with increased willingness to work rates.[619] [620] [621] [622] [623] In one study this was defined as 'preferential access to antiviral medication', which when offered resulted in an increase in willingness to work scores.[624] Interestingly, in the present study this preferential access was something mentioned by participants as important and was often something that was expected. For example, some participants spoke of getting medication ahead of 'the NHS queue' through their company's private medical insurance, and the health sector groups discussed the idea that they were essential workers and so could potentially get medication ahead of the public if they were required to come to work to help with the response. This study has been the first to reveal the extent of employees' expectations of their employers' medical response. Employers, therefore, need to be aware that their employees may expect medication, particularly if the organisation has provided flu vaccinations in the past. They should also be aware that this intervention that has the potential to increase the willingness of staff to come to work during a serious incident. In light of these findings, it is recommended that organisations consider the health interventions they could provide (e.g. treatment or vaccination), ensuring that these processes sit alongside current NHS or occupational health policies. More discussion about the possibility of providing medical interventions to employees can be found in Chapter 6.

Lastly, this focus group study has revealed potential barriers to the willingness and ability of employees to make use of business continuity interventions provided by their employers. For example, staff may not be able to work from home in the event of a serious incident because they might have left their remote access technology in the office the previous day.

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[618] Wray and Jupka, 'What Does the Public Want to Know in the Event of a Terrorist Attack Using Plague?'.
[619] Balicer et al., 'Characterizing Hospital Workers' Willingness to Report to Duty in an Influenza Pandemic'.
[620] Balicer et al., 'Characterizing Hospital Workers' Willingness to Respond to a Radiological Event'.
[621] Daugherty et al., 'Survey Study of the Knowledge, Attitudes, and Expected Behaviors of Critical Care Clinicians Regarding an Influenza Pandemic'.
[622] Yonge et al., 'Willingness of University Nursing Students to Volunteer During a Pandemic'.
[623] Young and Persell, 'Biological, Chemical, and Nuclear Terrorism Readiness'.
[624] Garrett, Park, and Redlener, 'Mitigating Absenteeism in Hospital Workers during a Pandemic'.

Furthermore, due to the perceived risk of catching pneumonic plague on public transport, those participants who had left their laptops or remote access tokens in the office were unwilling to travel to the office to collect them. These findings are not only unique to this study, but they also provide evidence of an issue that could cause significant disruption to businesses that would need their employees to be able to continue working from home during a denial of access event. Therefore, it is vital that organisations include this issue in their contingency plans. As mentioned by one participant, employers could look into the possibility of using a courier service to deliver the necessary equipment to employees at their homes. Similarly, although (as discussed in Chapter 3) organisations may provide an alternative location for employees to work, such as a backup office, participants in this study revealed they may not be willing to travel to these alternative sites. Therefore, in addition to developing interventions that focus on facilitating the ability of staff to report to work, organisations should consider situations where staff may be unwilling to use these. More discussion of these recommendations can be found in Chapter 6.

Methodological limitations

One possible limitation of the present study was that the sample was an opportunistic sample and the participants were recruited through gatekeepers at their organisations. It is possible that a certain type of individual, perhaps those who are more willing and helpful in nature, or conversely, those who wanted to avoid doing their normal work, would want to participate in a focus group. It is, therefore, possible that the views and experiences of these participants are not representative of the population of employees that were the focus of this study. Another potential limitation to focus group research is that participants might not all get a chance to speak during the session. However, in the present study participants were encouraged to provide their initial views individually on response sheets, and the focus group moderator encouraged all participants to respond by asking them individually for further comment or by asking them if they agreed or disagreed with other participants' opinion.

As with any research involving self-report data there is always a risk that participants are not being honest and in this study this could have occurred because people were participating alongside their colleagues. However, to help minimise this problem participants' line managers were not present in the same group as their employees and participants for each group were drawn from a range of departments within the organisations. Participants were also told that anything they said during the group would be confidential and their employer would not be

told. It is likely that these steps successfully created a 'safe environment' within which participants could express their views, as at least one person in each group was very vocal about the fact that they would definitely not be going to work, which encouraged others to voice their opinions, either agreeing or disagreeing with that decision. A related limitation to using focus groups is that opinions can be polarised during group discussion by the presence of strong opinions in the group. However, in addition to the moderator managing the group discussion, a way of helping to avoid this problem was by getting the participants to write down their first thoughts prior to the group discussion, making them less likely to vocalise a different view to the one they had just written down. Where participants did change their views because of others' opinions, this provides important evidence of the effect that group discussions can have on attitudes, something that can also occur in real life.

Conclusions

The present study has been the first of its kind to conduct focus groups with employees of different national infrastructure sectors in order to assess staff reactions to a CBRN incident. It has also been the first of its kind to assess the influence of a social media inject on employee concerns and likely behaviour. The research study has gained important insights into employees' likely concerns, behavioural intentions, information needs and expectations of their employer during a serious incident such as a pneumonic plague release, which may also apply to any major public health event.

Overall the findings have revealed that employees are likely to be concerned about the risk to their health and the health of their significant others by going to work in the event of an infectious disease outbreak, particularly one that has the potential to be fatal. These concerns could influence their behavioural responses and may result in them refusing to report to work. The study has also revealed that in the event of a serious incident such as a deliberate release of an infectious disease, employees would expect a great deal from their employer in terms of accurate scientific information and practical advice and also in terms of medication and hygiene interventions. The study has also revealed that ensuring employees feel that they are doing something to help and that they are part of the overall response of a national infrastructure organisation can encourage staff to come back to work in the event of a serious incident.

This study has highlighted the need for organisations to take into account likely staff concerns and needs during an incident involving a CBRN risk such as contagion or contamination, as well as employees' expectations of their employer such as communication or medical interventions. Organisations should include the issues identified in this study in their business continuity planning but should also take time to speak to their own members of staff to discuss their specific needs.

The findings from these focus groups, along with the findings of the web survey (Chapter 4) and systematic literature review (Chapter 2), have been compared to the assumptions of resilience professionals revealed in the interview study (Chapter 3) and these discussions are presented in the final chapter of this thesis (Chapter 6). The findings from the present study have also contributed to the development of a series of recommendations for employers of potential strategies that could promote resilience in their workforce and prevent absenteeism during an extreme event, which are also presented in Chapter 6.

Chapter 6: Conclusions and Recommendations

Introduction

Extreme events such as natural disasters, terrorist attacks and infectious disease outbreaks have the potential to cause serious disruption to national infrastructure organisations in the UK. The failure of staff to report to work can seriously undermine the ability of the organisations, and the UK as a whole, to respond to, and recover from serious incidents. CBRN incidents create unique challenges in light of their potential to cause widespread and long-term disruption. This is especially true when a contagious element or contamination is involved. A significant amount of research has examined public reactions to CBRN terrorist attacks.[625] [626] [627] [628] However, less is known about the likely responses of employees to these types of incidents. Although research examining the willingness and ability of healthcare workers to report to work during an extreme event has been conducted, little is known about employee levels of willingness and ability to report to work across for employees of other sectors of national infrastructure. As a result, the research presented in this thesis has provided much needed evidence regarding the likely concerns, behavioural responses and information needs of employees of national infrastructure organisations in the UK during CBRN terrorist attacks. It has also compared the assumptions of resilience professionals with the likely responses of staff, whilst examining the expectations staff have of their employer during a crisis. These findings have been used to inform the understanding of, and at times, challenge the academic framing of behavioural responses to extreme events. These findings have also been used to develop a series of practical recommendations for national infrastructure organisations. Organisational recommendations are as follows:

1. Plan for high-impact, low-probability scenarios such as CBRN terrorist attacks.

[625] Pearce et al., 'Communicating with the Public Following Radiological Terrorism'.
[626] Rogers et al., 'Mediating the Social and Psychological Impacts of Terrorist Attacks'.
[627] Wray et al., 'Communicating with the Public about Emerging Health Threats: Lessons from the Pre-Event Message Development Project'.
[628] Rubin et al., 'Perceptions and Reactions with Regard to Pneumonic Plague'.

2. Do not assume that all staff who are able to report to work during a serious incident (such as a CBRN terrorist attack) will also be willing to do so.
3. Take time to find out what concerns staff may have during extreme events and identify any barriers they may face. Include staff needs and likely behaviour in exercises and planning.
4. Understand the influence of an employee's 'significant others' on their behavioural responses during an extreme event and develop strategies that are inclusive of both the employee and their family.
5. Communicate with staff the importance of their role during an incident. Communicate with staff the importance of the organisation to national infrastructure.
6. Develop interventions that focus on facilitating the ability of staff to report to work, but also consider situations where staff may be unwilling to use these.
7. Facilitate organisational identification.
8. Consider appropriate information sources for staff during an incident and advise staff on the use of these. This includes consideration of who is the best person at the organisation to communicate with staff.
9. Provide accurate, scientific information to staff that emphasises the organisation's focus on health and safety and how they are protecting their staff.
10. Provide interventions to facilitate the willingness of staff to report to work, particularly medical treatment.
11. Focus on practical support and facilitating natural social cohesion, rather than relying on unsupported psychological interventions.

These recommendations, along with their links to academic theory, will be covered in greater detail later in this chapter. Before doing so, an overview of the aims and methodology will be presented.

Overview of the Research

The overarching aims of this thesis were to:

- Identify the assumptions that business continuity managers and business continuity plans make about employees' likely behaviour during, and in the aftermath of, a serious incident, including those involving CBRN hazards. This aim was achieved

through the analysis of 21 semi-structured interviews conducted with resilience professionals of national infrastructure organisations.

- Assess the willingness and ability of employees to report to work in the event of a range of hypothetical incidents, including CBRN terrorist attacks. This aim was achieved primarily through the use of a web survey with 321 employees of any industry.
- Examine the barriers and facilitators (both practical and psychological) that could influence employees' decisions about whether or not to report to work, along with identifying employee information needs and expectations of their employers' response during the incident. These aims were achieved through the web survey and a series of eight scenario-based focus groups with employees of national infrastructure organisations.

In addition to the primary data collection activities, the relevant psychological theories were examined in order to ground the research in established academic theory (Chapter 1) and a systematic literature review identified 65 relevant peer-reviewed academic research papers (Chapter 2).

The three studies (interviews, survey and focus groups) were analysed separately and a full description of the findings, and detailed discussions of the implications of those findings, can be found in the relevant chapters. This final chapter will synthesise the empirical findings from all the studies in order to form the overall research conclusions. These conclusions take the form of a series of practical recommendations for organisations. These recommendations have been informed by the findings of the primary data collection (Chapters 3-5), the systematic review of previous peer-reviewed literature (Chapter 2) and grounded in the relevant academic theories presented in Chapter 1. Therefore, each recommendation is discussed alongside links to the supporting evidence and theoretical frameworks.

Unique Contributions to Knowledge

The findings of this research have provided a number of unique contributions to our understanding of likely employee responses to extreme events, capable of:

(i) Challenging the assumptions made by resilience professionals from UK national infrastructure organisations about the likely behaviour and practical/psychological needs of staff during high-impact, low-likelihood events, such as CBRN terrorist attacks.

(ii) Informing the existing literature concerning the organisational, psychological and demographic factors that predict the willingness of staff to report to work during a range of hypothetical scenarios.

(iii) Demonstrating the importance of an organisation's practical interventions and communication strategies for motivating staff to return to work in the event of a serious incident.

The research has been the first to apply several theories to the topic of staff willingness to work during extreme events. Specifically, the author drew upon risk perception theory, risk communication theory, role conflict theory, organisational identification and job satisfaction. It is also the first study to apply the EPPM framework to employees other than healthcare workers and by using additional scenarios to pandemic, such as incidents involving CBRN hazards. These theories have been used to inform the recommendations for organisations presented in the next section.

The systematic literature review (Chapter 2) was the first literature review to include non-healthcare workers and identified many more studies (65 peer-reviewed research articles) than the previous two reviews (which reviewed 8 studies and 27 studies).[629] [630] The review confirmed the findings of previous reviews that a range of factors could potentially influence an employee's decision about whether or not to work in the event of an extreme event. Several gaps in the research literature were identified, including: (i) the need to apply the concept of willingness to work to sectors of national infrastructure other than health; (ii) the need to apply academic theory to the concept; and (iii) the need to compare the likely behaviour of staff of national infrastructure organisations to the assumptions of the decision-makers, the business continuity managers.

The interview study presented in Chapter 3 was the first of its kind and as such all the findings of the study are novel. The outcomes of the interviews indicate that resilience professionals are making various assumptions about the likely behaviour of their staff and are in general focusing more on the ability of their staff to report to work, than the willingness of their staff.

[629] Smith, 'Emergency Health Care Workers' Willingness to Work during Major Emergencies and Disasters'.
[630] Chaffee, 'Willingness of Health Care Personnel to Work in a Disaster'.

Resilience professionals at national infrastructure organisations differ in their opinions of whether or not it is an employer's responsibility to help or encourage its staff to report to work. Further, the interview study found that national infrastructure organisations do not generally include staff concerns in their exercises, nor do they invite staff from different levels of the organisation to participate in exercises in order to raise awareness of the organisation's response, or to discover their likely concerns and barriers to reporting to work.

A further unique finding of the interview study was that resilience professionals of national infrastructure organisations generally do not communicate to staff the importance of their role in an incident, nor do they communicate the fact that the organisation is part of UK national infrastructure. Finally, this study has been the first to examine the perceptions of resilience professionals with regards to what information their staff would want to receive from their employer during an extreme event and who would be the most trusted communicator of that information. The findings revealed a lack of knowledge about the content of the information staff would require during an incident, and assumptions were made about who staff would be most likely to trust in an incident.

The employee web survey presented in Chapter 4 examined a number of unique predictors of willingness to work for a range of different scenarios, using a sample which was not solely employees of the health sector or essential workers. Measures from organisational psychology such as organisational identification and job satisfaction were applied to the topic for the first time. Similarly, the Extended Parallel Process Model (EPPM) was used to examine the willingness to work of non-healthcare workers for incidents other than pandemic influenza.[631] This confirmed the findings of previous research in a novel study sample.[632] The findings revealed new associations between a number of predictor variables (e.g. organisational identification, job satisfaction and business continuity roles) and the willingness of employees to report to work for a range of hypothetical scenarios, as well as confirming the findings of previous research (e.g. the association between perceptions of health and safety and self- and response-efficacy and willingness to work). Furthermore, the web survey findings have provided support for a modified version of the EPPM. Specifically the results have confirmed that staff perceptions related to efficacy (i.e. the importance of their role and the role of their organisation) have a stronger influence on their willingness to report to work during a serious incident than their threat perceptions.

[631] Witte, 'Putting the Fear Back into Fear Appeals'.
[632] Barnett et al., 'Assessment of Local Public Health Workers' Willingness to Respond to Pandemic Influenza'.

A further unique contribution to the existing literature was the focus groups study. It was the first to use focus groups with employees of different national infrastructure sectors to investigate staff reactions to a CBRN terrorist attack. It has also been the first to assess the influence of a social media inject on employee concerns and likely behaviour during an incident. The study has revealed important insights into employees' likely concerns, behavioural intentions, information needs and expectations of their employer during a serious incident such as a pneumonic plague release. These findings support the findings of previous research in this area. Employees are likely to be concerned about the risk to their health and their families' health by going to work in the event of an infectious disease outbreak. This will be particularly apparent for diseases that have the potential to be fatal with human-to-human transmission. Consequently, these concerns could result in staff refusing to report to work.

The focus group study found that employees would expect a great deal from their employer during an extreme event in terms of accurate scientific information and practical advice. They would also expect numerous interventions, including those of a medical nature. This is the first time that these findings have been reported outside of the health sector. The study has also revealed a key finding that could be very useful for national infrastructure organisations: ensuring staff feel that they have an important role, and that they understand the wider implications of their organisation's recovery for UK national infrastructure, could encourage them to report to work in the event of a serious incident. This finding provides further support for the EPPM and is consistent with the findings of previous research.[633] These potential links between the findings of this research and previous academic studies and theoretical frameworks are revisited in greater detail throughout the rest of this chapter.

Key Novel Findings:

- Staff willingness to work in the event of a serious incident does not appear to be a front of mind concern for the majority of the resilience professionals involved in this research.
- Resilience professionals have different opinions about whether or not to prepare for high-impact, low-probability events such as CBRN terrorist attacks.
- Staff concerns are not often included in business continuity exercises and only a small minority of resilience professionals had spoken to staff about their likely behaviour or concerns, or included staff without a specific business continuity management role in their exercises.

[633] Witte, 'Putting the Fear Back into Fear Appeals'.

- Some key national infrastructure organisations would provide psychological interventions to employees in the aftermath of a serious incident, usually in the form of trauma counselling, and based on the advice of their private healthcare provider.
- Resilience professionals make various assumptions about the behaviour of their staff during a serious incident; for example, that they will report to work if they are able to, and, with regards to communicating with staff, what and who staff will trust.
- Staff willingness to work is potentially associated with factors such as organisational identification, job satisfaction, having a business continuity role, receiving business continuity training and believing that their organisation continuing to function would make a big difference to keeping the country running.
- Employees from a variety of sectors wish to receive medical treatment at their organisation in the event of a bioterrorist attack and this is considered a motivating factor for reporting to work.
- Even if staff have access to flexible working arrangements (remote access technology and alternative work locations) it does not mean they would be able and willing to make use of them.
- Some staff will use social media in an incident and be affected by what they see on it, even though they may acknowledge it is not a trusted source of information.

Key Recommendations for Organisations

This section presents a series of recommendations for national infrastructure organisations based on the findings of this thesis. These recommendations are discussed in relation to the results of the primary data collection of this PhD research, supported by the findings of past academic studies and grounded in psychological theory. They are grouped by whether they are strategies that should: i) be put in place **before** an incident; ii) be put in place **before** an incident but may also need to be emphasised/adjusted **during** an incident; or iii) take place **during** or in the **aftermath** of an incident.

Recommendations for strategies that should be put in place **BEFORE** an incident:

Recommendation 1: Plan for high-impact, low-probability scenarios such as CBRN terrorist attacks.

Although considered low-probability events, CBRN terrorist attacks could cause significant loss of life and also widespread disruption due to the complicated nature of recovery.[634] However, this research has revealed that many resilience professionals from national infrastructure organisations are reluctant to plan for these types of incidents. Some interviewees mentioned only planning for CBRN incidents when they directly affected their own infrastructure (i.e. when the supply of a water company is deliberately contaminated). Due to a general preference for impact-based planning over scenario planning, a number of interviewees discussed the fact they would not be concerned what the cause of an incident was, caring only about the impacts on the business.

The findings of this research, however, have revealed that the type of incident could play a significant role in staff behavioural responses during an extreme event. Specifically, the web survey revealed that employees are likely to be less willing to report to work during an incident involving a CBRN hazard, than one without. This conclusion is supported by findings of the systematic literature review (Chapter 2), which revealed that healthcare workers were less willing to report to work for incidents involving the threat of contamination or a contagious element, than one without. For example, Adams and Berry found that healthcare personnel in the US were most willing to report to work in the event of an explosion (93.0%) or a winter weather event (92.8%) and least willing to report to work during a SARS outbreak (74.6%) or a radiologic event (69.1%).[635] This provides support for risk perception theory, specifically that less familiar, more complex incidents (in terms of the hazards involved) such as CBRN terrorism are potentially more fear-inducing than natural disasters or explosions.[636] [637]

In light of these findings it is recommended that organisations treat CBRN incidents differently to conventional or natural incidents in their planning. They should consider the potential for their staff to react differently to CBRN terrorist attacks, due the increased concerns related to

[634] United Kingdom. HM Government, 'The United Kingdom's Strategy for Countering Chemical, Biological, Radiological and Nuclear (CBRN) Terrorism'.
[635] Adams and Berry, 'Who Will Show Up?'.
[636] Smith, Burkle Jr., and Archer, 'Fear, Familiarity, and the Perception of Risk: A Quantitative Analysis of Disaster-Specific Concerns of Paramedics'.
[637] Fischhoff et al., 'How Safe Is Safe Enough?'.

these unfamiliar incidents. Specifically, employees are likely to be concerned about threat to their health, as well as being concerned that they could infect or contaminate their significant others. Therefore, it is recommended that organisations use CBRN scenarios in their business continuity exercises. In particular, they should use scenarios involving a contagious or contamination element that could last longer than a week or two and affect multiple areas of the UK at the same time. It would also be useful to consider scenarios where there is no actual risk, but the public inaccurately perceive a risk to their health. For example, in the aftermath of a dirty bomb incident, radiation levels may be below the official safe levels; however staff could still be concerned about suffering negative health consequences as a result of travelling through the area affected by the original incident. Using these types of scenarios in exercises, involving staff from all levels of an organisation, will allow organisations to design and test interventions targeted at reducing employees' concerns about the health risks of reporting to work.

Recommendation 2: Do not assume that all staff who are able to report to work during a serious incident (such as a CBRN terrorist attack) will also be willing to do so.

The findings of the interview study revealed that many organisations assumed that their staff will report to work during an extreme event, such as a CBRN incident. Often this assumption was based on conventional wisdom, or experience of their staff reporting to work during a past incident that was less serious or not a CBRN event (i.e. during swine flu or the 7/7 London bombings). However, the web survey and focus group studies found that not all staff who are able to go to work during an extreme event will necessarily be willing to do so. For example, in the web survey, although 41% of employees said they would be able to go to work during an incident involving a deliberate release of smallpox, only 29% said they would be willing to go to work. This finding is supported by previous academic research identified in the systematic literature review (Chapter 2). For example, a US study of essential workers including hospital staff, police and fire officers found that although 80% reported they would be able to report to work in a pandemic, only 65% said they would be willing to do so.[638] Related to this, organisations need to factor into their planning the potential for their staff to be experiencing functionally-impairing mental health symptoms in the aftermath of an incident. These symptoms of distress and anxiety may prevent some staff from being able or willing to report

[638] Gershon et al., 'Factors Associated with the Ability and Willingness of Essential Workers'.

to work. It could also mean that the staff who do decide to report to work may be unable to function once they get there.

The implications of these findings are that organisations may be caught out during a CBRN incident if they have not planned for significant numbers of staff to be absent, or not functioning, and due to this, their ability to recover from the incident could be seriously undermined.

In addition to the possibility that business continuity managers are basing their expectations of staff on conventional wisdom, it is also possible that their beliefs are due to differing perceptions of risk. Past research has discussed the idea that experts and the public assess risk in different ways. Whereas the public base their risk perceptions on feelings or 'affect', *experts* analyse the risks in the world around them using logic, reason and scientific deliberation.[639] These contrasting methods for assessing risk could also provide an explanation for the web survey finding that individuals with a business continuity role were significantly more likely to report being willing to work during an extreme event than those without such a role. It is possible, therefore, that business continuity managers are making assumptions about staff behaviour based on their own perceptions of risk. This could potentially lead to rates of absenteeism being underestimated in business continuity planning.

During the UK financial sector market-wide exercise in 2006, participant organisations reported no significant problems with 25% of their staff absent during a pandemic, but noted that this would change if the rate increased much more.[640] The present survey study revealed that organisations should prepare for staff absenteeism rates higher than 25%, particularly for CBRN incidents. During the 2009 UK financial sector market-wide exercise, absenteeism rates from 25% to around 70% were tested for a two day severe weather scenario.[641] Although most organisations coped well, it was noted that they were relying on remote working capability, cross-training and bringing in staff from other areas of the business. In light of the findings of the present study, it would appear these organisations are making a potentially inaccurate assumption that other staff would be willing to report to work to cover the absent employees' work. Therefore, it is vital that in addition to planning for how absent employees' work would be completed by other staff members, organisations should also focus on developing

[639] Slovic et al., 'Risk as Analysis and Risk as Feelings'.
[640] United Kingdom. Financial Services Authority, 'UK Financial Sector Market Wide Exercise 2006 Report', January 2007.
[641] United Kingdom. Financial Services Authority, 'UK Financial Sector Market Wide Exercise 2009 Report', January 2010.

strategies that will facilitate the willingness and ability of absent employees to return to work. It is unhelpful to assume that an individual who is absent from work cannot be motivated to return.

Recommendation 3: Take time to find out what concerns staff may have during extreme events and identify any barriers they may face. Include staff needs and likely behaviour in exercises and planning.

Staff are likely to have a range of concerns and needs during an extreme event. The results of the interview study suggest that many national infrastructure organisations in the UK do not currently include staff concerns in their planning or exercises. The findings also revealed that, in general, organisations do not allow employees who are below executive level or do not have a specific crisis management role to participate in exercises. The implication of this is that assumptions are made on behalf of the majority of staff about their likely responses during extreme events. The findings of this research have revealed that, during an extreme event, staff are likely to be faced by numerous practical and psychological barriers to reporting to work. For example, in the focus groups employees discussed a range of concerns they would have about reporting to work in the event of a deliberate release of pneumonic plague. These concerns were primarily related to the risk to their health and the health of their significant others. Similarly, the web survey revealed that staff thought they would face a number of barriers to reporting to work, such as transport problems, lack of knowledge about the incident, stress/anxiety and childcare responsibilities. However, it should be noted that the sample contained a low number of respondents with children, and, as such, the results about childcare should be generalised with caution and the issue needs to be researched in greater detail. Nonetheless, the survey findings provide evidence of the variety of different barriers that could influence an employee's willingness and ability to report to work during an extreme event.

Similarly, the findings of the systematic literature review (Chapter 2) revealed that the barriers found in the present research have also been identified in previous academic studies. For example, Qureshi et al. found that the most frequently cited reasons for healthcare workers being unwilling or unable to report to work during a catastrophic incident were: fear and concern for self and family; transportation issues; and childcare.[642] The interview study

[642] Qureshi et al., 'Health Care Workers' Ability'.

(Chapter 3) revealed that although organisations had often considered interventions related to employees' ability to report to work (i.e. transport and childcare), they were less likely to have considered strategies to increase their willingness (i.e. related to their concerns for their health or their families' health). In light of this, it is recommended that organisations take time to find out the potential concerns of their staff for specific scenarios, particularly ones more complex and long-lasting in terms of the health impact, such as CBRN terrorist attacks.

One way of finding out this information from staff would be to invite staff from all levels of an organisation to participate in exercises. In these exercises staff could be asked about their likely behavioural responses, concerns and information needs during an extreme event. This staff involvement could also take the form of staff discussion/focus groups, with specific scenarios used to ground the discussions in a sense of reality. Once organisations are aware of the likely responses, concerns and needs of their staff, they can then design exercises that stress test the recovery of the organisation against situations in which staff are unwilling or unable to report to work. Furthermore, it could also be useful to include an HR representative in the exercises, as they are likely to have a greater understanding of the policies and procedures that specifically affect staff during a crisis, such as absence policies.

It is important for organisations to consider the costs and benefits of including non-BCM staff in exercises. The costs of such activities are going to be dependent on the size of the organisation and the type of exercise being conducted. However, little is known about the relative effectiveness of different types of exercises, i.e. table top, command-post or field, and whether the scenario materials or injects affect perceptions of reality or learning. There is some evidence to suggest that disaster drills can be effective at increasing hospital employees' familiarity with disaster procedures, identifying potential problems and giving staff the opportunity to put into practice lessons learned during real disaster response.[643] Disaster drills and simulations have also been shown to be useful in community preparedness for earthquakes.[644] Therefore it is possible that including staff in well-designed exercises could be of benefit to both the organisation and its staff. However, more research needs to take place to confirm whether this holds true with staff from organisations in sectors other than healthcare and to ascertain whether less-costly alternatives to field or live play exercises, such as table top exercises or simulations, can be as effective a training tool.

[643] Edbert B. Hsu et al., 'Effectiveness of Hospital Staff Mass-Casualty Incident Training Methods: A Systematic Literature Review', *Prehospital and Disaster Medicine* 19, no. 3 (September 2004): 191–99.
[644] David M. Simpson, 'Earthquake Drills and Simulations in Community-Based Training and Preparedness Programmes', *Disasters* 26, no. 1 (1 March 2002): 55–69.

Recommendations for strategies that should be put in place **BEFORE** an incident, but may also need to be emphasised or adjusted **DURING** an incident:

Recommendation 4: Understand the influence of an employee's significant others on their behavioural responses during an extreme event and develop strategies that are inclusive of both the employee and their family.

The interview study revealed that although many resilience professionals had considered that an employee's ability to go to work during an extreme event could be influenced by their significant others, fewer resilience professionals had considered this issue in terms of willingness to go to work. Furthermore, only a minority of resilience professionals said their organisation might be able to provide childcare. Others clearly stated that it was not the organisation's responsibility to help with this. However, the survey and focus group studies revealed that the issues surrounding the significant others of staff members cannot be ignored. The web survey study found that concern for significant others' health or safety was a frequently cited barrier to reporting to work during a serious incident. Similarly, although not many focus group participants had children, the ones that did mentioned keeping them off school/nursery. In addition, some participants mentioned that they might influence other adults such as spouses and adult children to stay away from work. Many participants were concerned about going to work and catching plague and then going home and infecting their families, particularly children or elderly relatives with weakened immune systems.

These findings provide support for Killian's theory of 'role conflict', which relates to the potential conflict individuals might have during a disaster between their loyalty to their family and the loyalty to their organisation.[645] This thesis supports the view that employees will be more likely to resolve this conflict in favour of their families, particularly during an incident in which an employee may perceive that they are increasing the threat to their significant others' health by reporting to work. They may accept that there is a risk to their own health by reporting to work, but they may not accept that they could also be putting their loved ones at risk by doing this. This source of stress has also been discussed in relation to the professional obligations of healthcare workers; for example, when healthcare workers are faced with a situation in which caring for a patient with an infectious disease could potentially put their

[645] Killian, 'The Significance of Multiple-Group Membership in Disaster'.

own health at risk, and subsequently the health of their families. This stress can be caused by feelings of guilt about whether they should be risking their families' health for the profession.[646] Similarly, one study revealed that when student nurses were asked whether they would be prepared to work with victims who could transmit disease, their responses were influenced by whether their families would receive protection (prophylactic antibiotics) or vaccine.[647]

It is recommended that organisations develop interventions that take into account the significant others of employees, both in terms of their influence on employees' willingness and ability to work. It could be useful to provide temporary accommodation for essential staff so that they do not have to go home at the end of each day. Furthermore, organisations could allow staff to work from home to care for sick relatives; keeping in mind that an employee who is in the office worrying about those at home is unlikely to be very productive. If an organisation does require staff to be in the office, then it is important to allow staff to keep in contact with their significant others, to prevent their concerns from distracting them. Finally, several past studies have reported the unavailability of childcare as a potential barrier to employees returning to work after an incident.[648] [649] [650] Therefore, it is recommended that organisations review their policies on childcare, either in terms of providing access to childcare in or near the workplace or allowing employees to work from home when there is no available childcare alternative. Although in this instance this recommendation is related to business continuity, it is also good practice for organisations to understand how employees' significant others influence their behaviour on a day-to-day basis.

Recommendation 5: Communicate with staff the importance of their role during an incident. Communicate with staff the importance of the organisation to national infrastructure.

The results of the research presented in this thesis have revealed the importance of ensuring staff are aware of their role during an incident and in particular, that they believe their role to be important. Staff should be informed that they work for a national infrastructure organisation and the importance of their organisation continuing to function during an

[646] O'Sullivan et al., 'If Schools Are Closed', 322.
[647] Young and Persell, 'Biological, Chemical, and Nuclear Terrorism Readiness', 112.
[648] Qureshi et al., 'Health Care Workers' Ability', 383.
[649] Stergachis et al., 'Health Care Workers' Ability and Willingness to Report to Work During Public Health Emergencies', 303.
[650] Garrett, Park, and Redlener, 'Mitigating Absenteeism in Hospital Workers during a Pandemic', S142.

extreme event. In the interview study (Chapter 3), however, few resilience professionals mentioned that they communicated to staff the importance of their role, nor that the organisation was part of national infrastructure. Of the interviewees who did tell staff they were part of national infrastructure, this was limited to essential or critical staff.

The findings of the studies with employees presented in this thesis have suggested that organisations may need to rethink their approach. For example, in the web survey it was discovered that an individual's role, or perception of their role, has a significant influence on their willingness to report to work in the event of a number of serious incidents. More specifically, those individuals who perceived that going to work during a serious incident would make a big difference to the organisation they worked for, were significantly more likely to report being willing to go to work. Similarly, those who perceived that their organisation continuing to function in a serious incident would make a big difference to keeping the country running, were significantly more likely to report being willing to go to work. These findings are also supported by past academic research examining the willingness of healthcare workers to report to work during an extreme event. For example, Balicer et al. concluded that the most influential factor associated with local public health workers' willingness to work during an influenza pandemic was their perception of the importance of their role in the agency's overall response.[651] Similarly, Goodhue et al. reported that the most significant factor predicting the willingness of paediatric nurse practitioners to respond was having a specified role in the workplace disaster plan.[652]

The findings also provide support for the EPPM, a model that was tested in the web survey (Chapter 4).[653] The EPPM is a threat and efficacy based model that is useful for understanding the behavioural responses of employees during extreme events.[654] This is the first time an academic study has applied the EPPM to the willingness of employees other than healthcare workers to report to work during extreme events. However, as noted in previous chapters, this was a modified version of the EPPM to make it more applicable to the present study population. In this research the efficacy variable was related to the perceived importance of the participants' response to their organisation and the perceived importance of their organisation to keeping the country running. The analysis revealed that *for* the present study sample, perceived efficacy in terms of perceived importance of role/organisation had a

[651] Balicer et al., 'Local Public Health Workers' Perceptions'.
[652] Goodhue et al., 'Willingness to Respond in a Disaster'.
[653] Witte, 'Putting the Fear Back into Fear Appeals'.
[654] Barnett et al., 'Gauging U.S. Emergency Medical Services Workers' Willingness to Respond to Pandemic Influenza'.

stronger association with willingness to work than perceived threat. This is a useful finding for organisations, as prior to an incident it will be more difficult to reduce perceived threat; this is often a task more suited to public health officials. However, organisations can focus on strengthening employees' beliefs that they as individuals are important, that the recovery of their organisation is important and that their organisation is able to respond to the incident effectively.

In the focus groups (Chapter 5) employees from the Government and health sectors recognised that their organisations needed to continue to function in order to help the country respond to and recover from an incident. This finding adds further support to the new feature of the efficacy variable in the EPPM uniquely developed for this research: employees need to be aware of the wider implications of their organisation's recovery. It was interesting to note that this acknowledgement of being part of national infrastructure and part of the country's response to the outbreak was not evident at all in the finance groups. In these groups there was no acknowledgement that their organisations needed to continue to function in order for the UK's financial transactions to continue. Similarly, out of all the sectors included in the focus groups, participants from the financial sector groups were the least willing to report to work during the scenario; just 5% reported that they would be willing.

In light of these findings it is recommended that all staff are made to feel important in the recovery of the business during a serious incident. This does not mean that all staff need to be told they have a role in the incident response, but they should understand that continuing with their normal day-to-day tasks will make a big difference to the recovery of the organisation. They should also be informed if there are wider implications of the organisation's recovery. For example, an energy company needs to return to normal functioning in order to keep providing power to the hospitals. This is especially relevant in national infrastructure organisations that need to keep functioning in order to keep the country running, but organisations that do not operate in a sector of national infrastructure can also suffer serious consequences if they were to stop functioning. For example, they might lose the ability to continue to pay their staff. All of this can be communicated to staff during an incident; however, it is really something that staff need to believe before an incident occurs. Organisations could include this information in their induction programmes and business continuity training or awareness activities, as well as ensuring this is something that managers regularly communicate to their staff. Overall, the findings of the present study have shown just how important the perception of efficacy (self and organisational) is in the willingness of staff to report to work during an extreme event.

Recommendation 6: Develop interventions that focus on facilitating the ability of staff to report to work, but also consider situations where staff may be unwilling to use these.

This research has revealed that national infrastructure organisations have considered the potential barriers to employees' ability to report to work. They have also developed interventions to facilitate the ability of their staff to continue to work during an extreme event. For example, many organisations could provide transport (taxis, coaches etc.), remote access technology and back-up sites. However, there were assumptions being made about the willingness of their staff to make use of these interventions. For example, there was a lack of acknowledgement that staff may refuse to use the transport provided, that staff may refuse to go to a back-up site, or that they may have left their remote access technology in the office. All of which were discovered as potential issues during the web survey and focus groups.

It is recommended that organisations do continue to include transport interventions as part of their business continuity planning. This is because, in addition to the present web survey study, a number of previous studies have also found that transportation problems are a barrier to employees' ability to report to work.[655] [656] [657] However, situations where staff refuse to use transport should also be considered. Organisations may need to provide private transport such as individual taxis, rather than coaches, as travelling with a large number of people in a confined space may be perceived as a significant risk by staff during an infectious disease outbreak. This private transport may also be needed in order to transport essential staff to back-up sites when the risk of travelling on public transport is judged as unacceptable. With regards to remote access technology, it is vital that organisations communicate the need for this equipment to be taken home every day or provide equipment to essential staff that they can keep at home. It may also be wise to have a contingency plan in place for those staff who have left their laptops in the office, possibly in the form of a courier service to send equipment out to employees' homes.

Recommendation 7: Facilitate organisational identification.

The findings of the present study have shown that organisational identification is associated with the willingness of employees to report to work during an extreme event. Organisational

[655] Gershon et al., 'Pandemic-Related Ability'.
[656] Ives et al., 'Healthcare Workers' Attitudes to Working during Pandemic Influenza'.
[657] Qureshi et al., 'Health Care Workers' Ability'.

Identification is a construct with its roots in Social Identity Theory.[658] Ashforth and Mael defined it as the experience of perceived oneness with a group.[659] One of the key features of organisational identification is when an individual experiences the success and failures of an organisation as if they were their own.[660] When this occurs they become part of an 'ingroup' with shared values, norms and goals.[661] The findings of the web survey revealed that those employees who identified more strongly with their organisation, due in part to their shared experience of the organisations' successes and failures, were more likely to report being willing to report to work during an extreme event.

Interestingly, only one resilience professional interviewed recognised the importance of this topic, mentioning his own idea that the promotion of shared values and goals within the organisation was the reason staff would report to work during an extreme event. It is recommended that all national infrastructure organisations take steps to foster their employees' sense of identification with the organisation, through the promotion of shared values and goals. This is something that should be embedded in an organisation's culture and something that could be implemented through the employee induction process, or as part of general staff training. Although not specifically focusing on organisational identification, previous research has identified relevant themes. For example, Gershon et al. reported that a measure of organisational trust/shared values was associated with essential workers' willingness to work in a serious pandemic event.[662] Similarly, a qualitative study by Ives et al. found that healthcare workers were motivated by a sense of 'confederate loyalty', and that barriers to their willingness to report to work included a lack of trust in, and goodwill towards, the NHS, and a feeling that employers do not take the needs of staff seriously.[663] Organisations require loyal staff during an extreme event, whose goodwill towards their employer will motivate them to report to work.

In addition to developing shared values and goals, organisational leaders, particularly ones that are going to be providing staff with information and instruction during an incident, should be viewed as 'prototypical ingroup members'.[664] This means they should be representative of the organisation as a whole and display the shared values and goals of the organisation. If they are seen as prototypical ingroup members then it is more likely they will be able to strengthen

[658] Henri Tajfel and John Turner, 'An Integrative Theory of Intergroup Conflict'.
[659] Ashforth and Mael, 'Social Identity Theory and the Organization'.
[660] Mael and Ashforth, 'Alumni and Their Alma Mater'.
[661] Haslam and Platow, 'The Link between Leadership and Followership'.
[662] Gershon et al., 'Factors Associated with the Ability and Willingness of Essential Workers'.
[663] Ives et al., 'Healthcare Workers' Attitudes to Working during Pandemic Influenza'.
[664] S. Alexander Haslam, *Psychology in Organizations: The Social Identity Approach* (London: Sage, 2001).

organisational identification in an organisation. Research has found that prototypical ingroup leaders, or leaders who promote collective interests associated with a shared ingroup identity, are more likely to have the support of their staff.[665] [666] By extension, this could also mean that staff are more likely to trust them and follow their advice during an incident. It is, therefore, recommended that the leaders at an organisation, from the CEO down to line managers, receive training on how to promote the shared identity of the organisation, by ensuring that their behaviour and communication epitomises the organisation's shared values and goals. They should also ensure they communicate with staff using language such as 'us' and 'we' instead of 'you' in order to facilitate the perception that they belong to the same group.[667] Organisations could also consider ways they could appoint prototypical ingroup members to key crisis management roles. They could include an interview or assessment as part of their selection process and train the reviewers on the qualities and values that should be present in a prototypical leader.[668] Considering the potential influence that organisational identification can have on the willingness of employees to report to work during an extreme event, it is vital that national infrastructure organisations develop strategies to promote a sense of shared identity amongst their staff from day one. Further, due to the fact that organisational identification has previously been linked to other positive workplace behaviours such as productivity, promoting a sense of organisational identification in its employees is something that organisations should include as part of their overall business strategy.

Recommendation 8: Consider appropriate information sources for staff during an incident and advise staff on the use of these. This includes consideration of who is the best person at the organisation to communicate with staff.

Communication methods were comprehensive and well-tested by the organisations included in the research; however few resilience professionals had considered which person at an organisation should communicate with staff and who staff would trust the most. For the interviewees who had considered these issues, their assumptions were usually based on

[665] Michael J. Platow and Daan van Knippenberg, 'A Social Identity Analysis of Leadership Endorsement: The Effects of Leader Ingroup Prototypicality and Distributive Intergroup Fairness', *Personality and Social Psychology Bulletin* 27, no. 11 (November 2001): 1508–19.
[666] Haslam and Platow, 'The Link between Leadership and Followership'.
[667] Ibid.
[668] Andrew Carnes, Jeffery D. Houghton, and Christopher N. Ellison, 'What Matters Most in Leader Selection? The Role of Personality and Implicit Leadership Theories', *Leadership & Organization Development Journal* 36, no. 4 (18 May 2015): 360–79.

conventional wisdom. In the focus groups, it was revealed that employees would want to get their information from a variety of sources, including health experts. These health experts can either be internal to an organisation (e.g. the organisation's Chief Medical Officer) or external (an individual from Public Health England). For non-health related information, such as whether they should come to work and information about their organisation's response and long-term recovery plan, staff wanted to hear from someone at the top, such as the CEO. However, some participants then wanted this information to be filtered down through someone they knew personally, usually their line manager. It is therefore recommended that organisations base their communication strategies on these findings.

It is also important that business continuity planning is based on academic evidence. For example, Pearce et al., in their focus group study of public reactions to a hypothetical RED terrorist incident, found that the participants were generally sceptical of the media due to perceived scaremongering in the past, but were generally trusting of a non-governmental scientist.[669] Similarly, Pearce et al., in their survey study examining public risk communication following a chemical spill found that the extent to which the public trusted the authorities giving the advice directly influenced their intention to comply with the recommendation to shelter in place.[670] It is therefore vital that organisations use a trusted figure to communicate information to its employees. Those employees in the present study's focus groups who wanted information from their line managers, believed their line managers would be less likely to lie to them because they knew them personally. It is important to understand that different people will trust different sources of information, and as such, organisations should use more than one person to communicate messages to staff during a crisis. In light of this, it is recommended that organisations use staff members such as the CEO, the chief medical officer and also line managers to communicate information to employees, particularly when the message is something they need to believe in order to come to work, for example that the risk to their health by coming into the office is sufficiently low.

With regards to social media, although some resilience professionals were reluctant to include it in their planning, the focus group study revealed that some staff will use social media as a key source of information. Even though the majority of participants said they did not trust social media because information was often false or exaggerated, many would still use it to look at general trends. The analysis also revealed that some participants' concerns and behavioural responses were influenced by what they read in the social media inject.

[669] Pearce et al., 'Communicating with the Public Following Radiological Terrorism'.
[670] Pearce et al., 'Communicating Public Health Advice After a Chemical Spill'.

Consequently, it is recommended that business continuity professionals review their social media policies and, in particular, communicate to staff the trusted sources of information on social media. For example, they could direct them towards the official social media accounts of Public Health England, central Government or the Police. They could also help staff to understand how using social media in a certain way could result in inaccurate information. For example, if individuals search for details about an incident using a 'hash tag' they may be presented with false information, rumours, or fake photographs from other public users. This is knowledge that would be useful to staff on a day-to-day basis and not simply during an incident. Lastly, organisations could potentially instruct staff to use social media as a way of checking on the status of their friends and families during an incident, and as an efficient way of communicating to others that they are safe. This could reduce the potential for them to be distracted whilst at work if they have been unable to contact their loved ones using traditional communication methods.

Recommendation 9: Provide accurate, scientific information to staff that emphasises the organisation's focus on health and safety and how they are protecting their staff.

In the event of a CBRN terrorist attack or other public health emergency, employees will expect accurate, scientific information from their employers. The results of the focus group study revealed that employees will expect some form of communication from their employers almost immediately after an incident. It is therefore important for employers to send out a holding statement to their staff in the immediate aftermath of an incident. If key information is not known at that early stage, then it is important to acknowledge that fact and to say that more information will be sent as soon as it is known. Similarly, organisations should not withhold information from their own staff, as this may lead to them not being viewed as a trusted source of information in the future. Rogers and Pearce have suggested that some of the distrust the public have in the authorities is possibly a result of information being withheld from the public during past incidents.[671] This may have occurred because authorities designed their risk communication materials based on an assumption that the public would panic if they knew the full extent of the situation, an assumption that we now know is largely unfounded. Therefore, it is recommended that organisations provide accurate, scientific/technical information to staff regarding the potential risks of an incident. The focus group analysis revealed that staff want to base their personal risk assessments on this information.

[671] Rogers and Pearce, 'Risk Communication, Risk Perception and Behavior'.

It is vital that employers provide their staff with accurate information concerning the risks they could face by going to work, keeping in mind that without the facts, employees could be under or overestimating the risks to their health and that of their significant others. This is particularly likely during unfamiliar incidents such as CBRN terrorist attacks, due to individuals basing their risk perceptions on their feelings about similar risks.[672] Risk perceptions formed as a result of these generalisations are likely to be inaccurate. Due to the need to get accurate, technical information to staff as quickly as possible during an incident, it is recommended that organisations test their possible communication messages with staff prior to an incident in order to get feedback. It is also recommended that resilience managers seek out the relevant factsheets and information sources in advance, so that they have these to hand when an incident does occur. Organisations should also form relationships with well-respected subject experts, who they could contact during an incident to provide technical information and guidance to their staff.

It was also revealed in the present research that staff wanted information about their organisation's long-term recovery plan and what specific actions their employer was taking to protect their health and safety. Similarly, those survey respondents who believed that health and safety was a high priority with management where they work were more willing to report to work during an extreme event. Therefore, organisations need to communicate specific details about how they are protecting their staff during an incident, for example what interventions are in place and how these will reduce the risks to staff. In addition, organisations should embed a focus on health and safety into their day-to-day culture, by using conspicuous health and safety interventions and regularly communicating health and safety information, particularly as it relates to responses to major incidents. Past research provides further support to these recommendations. For example, Irvin et al. reported that for those healthcare workers unsure about their intentions to report to work in an avian influenza pandemic, the most important facilitating factor was their confidence that the hospital could protect them.[673] Bar-Dayan et al. discovered that healthcare workers' willingness to risk ones' life for a patient during an A/H1N1 pandemic in Israel was significantly lower for those with less trust in workplace preparedness and in the effectiveness of safety measures.[674] Therefore, it is important that staff believe their organisation is capable of protecting their health and safety prior to an incident and this message should also be reinforced during the incident.

[672] Rogers et al., 'Mediating the Social and Psychological Impacts of Terrorist Attacks'.
[673] Irvin et al., 'Survey of Hospital Healthcare Personnel Response during a Potential Avian Influenza Pandemic'.
[674] Bar-Dayan et al., 'Who Is Willing to Risk His Life'.

Recommendations for **DURING** or in the **AFTERMATH** an incident:

Recommendation 10: Provide interventions to facilitate the willingness of staff to report to work, particularly medical treatment.

The scenario-based employee focus groups revealed that staff would expect a variety of interventions during a pneumonic plague outbreak, most frequently related to medical treatment. Participants expected their organisation to provide medication, often in their workplace or delivered to their home, as well as other interventions such as diagnostic testing, vaccinations, PPE and hand gels. These types of interventions made staff more willing to report to work. It was found that staff may not want to go to the official treatment centres due to the perceived increased risk associated with these locations. Due to this, staff in the focus groups said they would be more willing to go to work if they felt they were 'jumping the NHS queues', or avoiding the crowds, in order to get medical treatment. However, the study also revealed that although some resilience professionals said they would think about providing medication, they were often unsure about the practical and ethical issues with doing this. Previous literature examining the willingness of healthcare workers to report to work during extreme events has also found evidence that providing medication can increase employees' willingness to work.[675] [676] [677] In one study this was defined as 'preferential access to antiviral medication', which when offered to employees, resulted in an increase in willingness to work scores. [678] Another study found that being offered the treatment on site was important to staff; being offered the treatment at a remote site reduced the willingness rate by nearly half.[679]

It is recommended therefore that organisations consider whether they could, and whether they should, provide medical treatment to employees. However, they should also consider the numerous ethical and practical issues involved. It is also important to remember that just because staff want a specific medical treatment does not mean it is the right option for them. For example, staff may wish to receive antibiotics as a treatment, but we must all consider the long-term implications of overprescribing antibiotics on antibiotic resistance and the resulting serious risks to the future health of the world's population. Organisations should take advice

[675] Balicer et al., 'Characterizing Hospital Workers' Willingness to Report to Duty in an Influenza Pandemic'.
[676] Balicer et al., 'Characterizing Hospital Workers' Willingness to Respond to a Radiological Event'.
[677] Daugherty et al., 'Survey Study of the Knowledge, Attitudes, and Expected Behaviors of Critical Care Clinicians Regarding an Influenza Pandemic'.
[678] Garrett, Park, and Redlener, 'Mitigating Absenteeism in Hospital Workers during a Pandemic'.
[679] Syrett et al., 'Will Emergency Health Care Providers Respond to Mass Casualty Incidents?'.

from public health officials, such as those at Public Health England, as to whether a treatment option is advisable and not solely rely on their private healthcare providers who may have financial reasons for their recommendations. If, however, treatment is deemed appropriate, organisations should consider where they could prescribe this medication, on site being preferable. They should also exercise for scenarios in which the medication is in short supply. In these situations they would need to consider if they should only supply medication to essential workers and also consider the message that this policy would be sending to the rest of the workforce. Furthermore, they should decide what they would do if the official recommendation is to prescribe medication, but it is not cost effective for the organisation. It will be important to communicate clearly the justification for not providing medication, particularly if the organisation has provided this in the past for other situations (e.g. flu vaccinations). If there are scientific reasons for not supplying the medication to staff, for example if it is not known to be effective, if it could result in more resistant strains of bacteria, or has side effects, then these reasons should be communicated clearly to staff. This is important in light of the present study's findings that staff will expect medication from their employer during an infectious disease outbreak. Furthermore, research has shown that providing vaccination, medication or protective equipment to an employee's family is also something that could increase their willingness to work.[680] [681] [682] Therefore, organisations should also consider whether this is an option that could be written into their business continuity plans.

However, it is vital that any medical treatment or services provided to an individual by an organisation are communicated to that individual's general practitioner, to avoid any potential duplicate or contradictory treatment. Conversely, private healthcare providers or occupational health departments would require access to an individual's medical records to ensure there are no potential interactions with other medications they may be taking. This process is already routinely followed for patients who receive both private and NHS medical care; however it can be a slow process and would need to be improved. In the event of an incident requiring a widescale public health response, there is the potential for both occupational health services and private healthcare providers to assist in the response and therefore facilitate the recovery of UK national infrastructure organisations, as well as relieving some of the pressure from a potentially overstretched NHS. However, it is vital that these services are

[680] Daugherty et al., 'Survey Study of the Knowledge, Attitudes, and Expected Behaviors of Critical Care Clinicians Regarding an Influenza Pandemic'.
[681] Garrett, Park, and Redlener, 'Mitigating Absenteeism in Hospital Workers during a Pandemic'.
[682] Gershon et al., 'Pandemic-Related Ability'.

designed to sit alongside current NHS policies and that they adhere to the relevant legislation, and, most importantly, are part of a coordinated response.

Recommendation 11: Focus on practical support and facilitating natural social cohesion, rather than relying on unsupported psychological interventions.

The interview study revealed that although a number of interviewees mentioned that they would provide psychological interventions in the aftermath of an incident, there was no discussion concerning what type of intervention would be most appropriate. Furthermore, of the interviewees who said they could provide a psychological intervention, most said they would be advised by a third party organisation (usually their private healthcare provider) what type of psychological intervention to use, which was usually a form of 'trauma counselling'. There is no doubt that CBRN terrorist attacks have the potential to cause widespread psychological consequences. However it is important to understand that not everyone involved in a traumatic incident will go on to develop a psychological disorder such as depression or post-traumatic stress disorder (PTSD).[683] [684] Nonetheless, the symptoms of stress and negative emotions experienced by some employees as a result of the incident could impact on their ability to return to normal functioning. For example, as a result of the Anthrax attacks in 2001 in the US, Capitol Hill staff workers experienced concentration difficulties, an inability to focus on work and avoidance of related information.[685] Therefore, it is important to acknowledge the psychological impact of an incident on the employees of an organisation. However, it is not advisable to implement blanket 'trauma counselling' or conduct 'single session-psychological debriefing' with all individuals involved in an incident.[22] Providing these types of interventions to all staff at an organisation does not have any recognised benefit and potentially could do more harm than good. It could make individuals believe they should be experiencing psychological symptoms or force them relive an incident unnecessarily.

Therefore, it is recommended that organisations help staff to understand that feeling stressed or anxious in the aftermath of a serious incident is normal. In the immediate aftermath it is important to focus on meeting the practical needs of staff when providing care, but also make

[683] George A. Bonanno, 'Loss, Trauma, and Human Resilience: Have We Underestimated the Human Capacity to Thrive after Extremely Aversive Events?', *American Psychologist* 59, no. 1 (January 2004): 20–28.
[684] Cleto DiGiovanni Jr, 'The Spectrum of Human Reactions to Terrorist Attacks with Weapons of Mass Destruction: Early Management Considerations', *Prehospital and Disaster Medicine* 18, no. 3 (July 2003): 253–57.
[685] North et al., 'Capitol Hill Workers' Experiences'.

sure access to psychological interventions are in place and conspicuous for those who need to use them. Organisations could consider implementing peer-support programs in which volunteer staff members are trained in skills such as psychological first aid. However, as much of the existing research focuses on high-risk organisations such as the police and military, more research is needed to assess the effectiveness and feasibility of introducing these peer-support programs in organisations that are not considered high-risk.[686] [687]

In light of the finding that many resilience professionals would be advised by a third party organisation (e.g. their private healthcare provider) about what type of intervention to use, it is recommended that organisations seek independent expert advice. Organisations should, where possible, not base their decisions on the advice of a third party that could benefit financially from the recommendation to provide specific interventions. If advice from an independent organisation is not available, then resilience professionals should make use of available research and base their decisions on peer-reviewed research evidence.

Following on from this recommendation, it is important that organisations consider the issue of 'presenteeism' in the workplace. The term presenteeism is used to describe a situation whereby an individual may report to work when they are either physically or psychologically unwell, something that may have a negative impact on productivity.[688] [689] It is important that that line managers are taught to communicate to their teams the importance of not attending the workplace if unfit, either physically or psychologically. They should also tell their employees that there will not be any negative consequences on their employment if they are absent and what the impacts might be if they do choose to attend work whilst unwell; for example that they might spread a virus to their colleagues or that they could lengthen their own recovery time by coming back to work too soon. Organisations should also make sure that the appropriate HR policies are in place and communicated to employees so they are aware they can take a sick day without fearing they may lose their job. The leaders within an organisation should also set a good example by not coming to work if they are visibly unwell as this can reinforce an unhelpful culture of presenteeism. This is not only something that should happen in the event of a serious incident, but something that should be embedded into an organisation's day-to-day culture. Finally, line managers should be taught how to spot presenteeism within their teams. They should focus on communicating with their staff and

[686] Greenberg, Langston, and Jones, 'Trauma Risk Management (TRiM) in the UK Armed Forces'.
[687] Grauwiler, Barocas, and Mills, 'Police Peer Support Programs'.
[688] David J. Smith, 'Absenteeism and "Presenteeism" in Industry'.
[689] Johns, 'Presenteeism in the Workplace'.

being sympathetic to their feelings and concerns; this is all part of building meaningful relationships within teams. Managers' training should emphasise that although physical symptoms might be easy to spot, it will be more difficult to notice team members who are suffering from symptoms of psychological distress or disorder. Again, this is not solely related to business continuity and should be considered part of good general management.

Strengths and Limitations of the Research

This research has many strengths, one of which is its mixed methods design. Mixed methods research combines qualitative and quantitative data collection, drawing from the strengths of both, and at the same time minimising the weaknesses.[690] Two or more data collection methods can be used to obtain a more accurate view of the phenomenon being studied – a concept known as triangulation.[691] When there is convergence between the findings of separate studies this allows researchers to be more confident in their conclusions. Although the interview study was somewhat separate in its focus on organisational responses, the survey and focus group studies were both designed to examine staff responses. By conducting a web survey followed by scenario-based focus groups, the researcher was able to move between broad, more general knowledge and deeper, richer insights, in order to capture a more accurate representation of reality.[692] It should also be pointed out that just because it is not possible to directly compare the results of the three studies, this does not mean that they cannot be combined with care in order to form conclusions and to support recommendations. However, although there are clear benefits to using different methods to examine the same topic, this does not mean the individual studies' limitations can be ignored.

A further strength of the research is that the design of each study was informed by the findings of the preceding studies. The findings of the systematic literature review revealed a variety of influences on the ability and willingness of employees to report to work during extreme events; these factors were then included as part of the interviews with resilience professionals, contrasted with findings of the web survey and confirmed by the results of the scenario-based focus group studies. The scenario of the focus group study was selected due to the findings of

[690] R. Burke Johnson and Anthony J. Onwuegbuzie, 'Mixed Methods Research: A Research Paradigm Whose Time Has Come', *Educational Researcher* 33, no. 7 (January 2004): 14–26.
[691] Todd D. Jick, 'Mixing Qualitative and Quantitative Methods: Triangulation in Action', *Administrative Science Quarterly* 24, no. 4 (1 December 1979): 602–11.
[692] Christina Foss and Bodil Ellefsen, 'The Value of Combining Qualitative and Quantitative Approaches in Nursing Research by Means of Method Triangulation', *Journal of Advanced Nursing* 40, no. 2 (October 2002): 242–48.

the web survey revealing pneumonic plague had one of the lowest rates of willingness to work amongst survey respondents. Pneumonic plague was also selected as the terrorist agent due the systematic literature review revealing more barriers and facilitators and more long-term issues, related to infectious disease outbreaks (concerns about catching an infection, risk to families' health, medication, vaccination etc.) than conventional or more short-term incidents. The decision to use a social media inject in the focus groups was a direct result of the resilience professionals in the interview study revealing mixed views about the use of social media during an incident.

The biggest strength of this research is its ability to produce unique findings that can be applied in the real world, to increase the likelihood of national infrastructure organisations recovering from disruption in a timely manner.

The research also had some limitations that need to be acknowledged here. The specific limitations related to the individual studies are described in more detail in the relevant chapters. More generally, the studies used opportunistic sampling methods and, as such, were not always demographically or geographically representative of the UK population. The survey study only included a relatively small sample for a quantitative study (n=321); however the sample of interviewees (n=21) and the sample of focus group participants (n=53) were considered of a sufficient size for qualitative research. It is also possible that people who are generally more helpful in other aspects of their lives were more likely to fill in the survey or volunteer for the focus groups. These more helpful people might be more willing to help during emergencies and, therefore, the willingness rates could have been overestimated. Another potential sample bias could have occurred due to the fact that employees with operational or business critical roles may have been less likely to volunteer to participate in the web survey or focus groups, due to the essential nature of their day-to-day roles.

As with all data collection methods that make use of self-report, it is hard to verify the authenticity of the data. It is also possible that participants' responses were influenced by a social desirability bias and group polarisation. However, steps were taken to help prevent these potential methodological issues (e.g. the use of the 'first thoughts' written responses in the focus groups) and the low levels of willingness reported in the survey and focus groups studies indicate that participants were not strongly influenced by social desirability bias.

A final issue to be considered is that willingness rates reported in this study may not translate into actual rates of attendance during the incidents, due to sample biases or other details

specific to the scenario. For example, absenteeism rates are likely to be higher in a pneumonic plague incident during which there are enough antibiotic doses for the whole population, than for a situation when they are in short supply. This however does not mean the willingness rates are not useful; they still present an interesting comparison of likely employee responses to different types of incidents and should therefore be considered as a relative measure rather than an absolute measure. It is important for organisations to consider which types of incidents might be more fear-inducing than others for staff and thus may result in higher rates of absenteeism.

Ideas for Future Research

In light of the findings of the present research, some ideas for future research are suggested here.

A larger, more demographically and geographically representative study is needed to test some of the findings of the interview study more widely, perhaps in the form of focus groups or a web survey. It would also be useful to interview business continuity managers at organisations that have experienced disruption caused by the same incident in order to provide a direct comparison, preferably in the immediate aftermath of the incident so that it is fresh in the interviewees' minds.

Furthermore, there is a need to replicate the web survey with a larger, more representative sample to test some of the findings more widely. Alternatively, a survey study comparing staff from a small number of different organisations would be useful to allow more details about the organisation and individual roles to be included. It would be invaluable to collect survey data in the aftermath of a real incident to see if the predictor variables reported in the present study also have a role to play in actual rates of attendance. For such a study it would be useful (although potentially not practical) to have collected data on the psychological measures such as organisational identification prior to the incident occurring.

The focus group study findings have suggested possible differences in willingness to work between staff of different sectors; however this needs to be tested on a larger scale to see if the differences are statistically significant. It would also be useful to compare the willingness to report to work of 'critical' or 'essential' workers with those who are not, either through a survey or focus groups.

This study has revealed new and interesting findings regarding the influence of social media content on employee reactions and, as such, this is something that warrants further research. It would be useful to compare different forms of social media or manipulate the message content and measure employees' reactions to these using quantitative measures. The focus groups made use of just one scenario; therefore, it would be interesting to directly compare employee reactions to different scenarios (such as chemical or radiological incidents), as well as comparing deliberate terrorist incidents to accidental ones.

Lastly, this research examined the influence of risk communication on willingness to work, as well as discussing which individuals at an organisation should be used to communicate information to staff. To extend these findings, it is recommended that future research examines the affect that different leadership styles might have on staff willingness to report to work in the aftermath of a serious incident, as well as looking at the specific content of the messages that leaders present to staff.

Conclusions

Prior to this study there was a need for empirical research examining the likely responses of staff from all sectors of national infrastructure during an extreme event such as a CBRN terrorist attack. There was also a need to compare the assumptions of national infrastructure organisations with the likely behaviour of staff in the event of a CBRN terrorist attack. This research has provided much needed empirical evidence to address these gaps in knowledge. The results have been used to formulate a series of recommendations that organisations can implement as part of their BCM programmes. These practical interventions are aimed at increasing likelihood that staff will report to work in the event of a CBRN terrorist attack or other public health emergency.

The findings of this research have revealed that not all staff will be willing to go to work during an extreme event. In the case of some CBRN incidents, less than a quarter of staff reported they would be willing to go work. The interview study discovered that many resilience professionals assumed their staff would be willing to report to work during an extreme event. It also found that organisations had not placed sufficient emphasis on facilitating staff willingness to return to work during a crisis. This is a serious issue considering that the web survey and focus groups revealed staff will face a variety of barriers and expect a great deal from their employer during an extreme event. At present, national infrastructure

organisations' plans will not meet the expectations of their staff and address their numerous practical, psychological and communications needs in the event of a CBRN terrorist attack. However, this research has revealed a variety of factors that could facilitate employees' timely return to work. In light of these findings, it is vital that national infrastructure organisations review their business continuity planning, putting more emphasis on the human factor of their organisation's recovery and develop strategies to motivate their staff to return to work.

Some of the recommendations for organisations developed from the findings of this research are to be included in an upcoming industry publication. The report entitled 'Willing and Able: Building a Crisis Resilient Workforce' is due to be published by Deloitte in early 2015.

The dissemination of this research could have a significant impact on the ways in which organisations prepare for and respond to high-impact, low-likelihood events by:

(i) Challenging and changing resilience professionals' understanding and expectations of likely staff responses to high-impact, low-likelihood events.

(ii) Highlighting the importance of including likely responses and needs of staff during an extreme event in business continuity planning and processes.

(iii) Informing business continuity management in UK national infrastructure organisations by recommending strategies that could be used to motivate staff to return to work.

This research has used theories of risk perception and risk communication, alongside theoretical frameworks from health psychology and social psychology to investigate organisational and employee responses to high-impact, low-likelihood events such as CBRN terrorist attacks. A number of these theories have been applied to the topic of staff willingness and ability to report to work during an extreme event for the first time. The findings presented in this thesis have addressed a number of significant knowledge gaps in the original research and have highlighted the importance of including staff responses in the business continuity management and plans of UK national infrastructure organisations.

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Dissertations/Theses

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Appendix A: Systematic literature review table

Table A1 Methods and key willingness findings of all articles included in systematic literature review

Reference	Method	Scenario(s)	Key willingness findings
Adams & Berry (2012)	Survey of 1342 healthcare personnel in U.S.	Multiple incidents	Willingness rates: Explosion (93.0%); winter weather (92.8%); influenza pandemic (85.1%); chemical event (80.9%); tornado/flooding (80.4%); smallpox epidemic (79.4%); SARS outbreak (74.6%); radiologic event (69.1%). Commonly expressed barriers to reporting to work were; concern for self/others, responsibility for spouse with healthcare needs/disability, effect of disaster on self/others, childcare responsibilities and pet care.
Alexander & Wynia (2003)	Survey of 526 physicians in U.S.	Bioterrorism	80% willing to continue caring for patients in the event of an outbreak of an unknown but potentially deadly illness. 40% willing to put self at risk of contracting a deadly illness to save others' lives. 33% would care for infected smallpox patients even if unvaccinated.
Balicer et al. (2006)	Survey of 308 local public health workers in U.S.	Influenza pandemic	53.8% of employees likely to report to work. Likelihood of reporting to work was significantly higher for clinical than technical and support staff.
Balicer et al. (2010)	Survey of 3426 hospital employees in U.S.	Influenza pandemic	Willingness to respond was 82.5% if required and 72% if asked but not required. Significant predictors of willingness were: belief that pandemic is likely and of its severe consequences; level of perceived knowledge of pandemic events; perceived importance of one's role in the hospital's overall response; perceived safety; perceived ability to perform one's duties; and others. Study used Extended Parallel Process Model.
Balicer et al. (2011)	Survey of 3426 hospital employees in U.S.	Radiological event (RDD)	Willingness to respond was 50% if required and 39% if asked but not required. 27.9% of the hospital employees with a perception of low efficacy declared willingness to respond to a severe RDD event. Significant predictors of willingness were: perceived high impact of ones' response; perceived safety; perceived confidence about getting to work safely; perceived ability to perform one's duties.
Bar-Dayan et al. (2010)	Survey of 1147 healthcare workers in Israel	A/H1N1 Pandemic	84% of HCWs who read a scientific article about A/H1N1 flu were willing to risk their lives for a patient compared to 73% who had not read an article. 82% of HCWs who were acquainted with Ministry of Health regulations were willing compared to 69% who were not.

Reference	Method	Scenario(s)	Key willingness findings
Bar-Dayan et al. (2011)	Survey of 1147 healthcare workers in Israel	A/H1N1 Pandemic	Willingness to risk one's life for a patient significantly lower in females, younger employees (18-24), administrative staff, those with a non-academic education, those with less knowledge about safety measures, those with less trust in colleagues, in workplace preparedness and in the effectiveness of safety measures.
Barnett et al. (2009)	Survey of 1835 local public health workers in the U.S.	Pandemic influenza	92% were willing to respond if required and 86% were willing to respond if asked but not required. Study used Extended Parallel Process Model (EPPM). Those employees with a perception of high threat and high efficacy were more likely to be willing to respond than those fitting a 'low threat/low efficacy' EPPM profile.
Barnett et al. (2010)	Survey of 586 emergency medical services (EMS) workers in U.S.	Pandemic influenza	93% would be willing to report to work, if required, and 88% would be willing to report to work if asked, but not required. If there was a possibility for disease transmission to family members, the willingness-to-report rate was 48%. Study used Extended Parallel Process Model. Confidence in personal safety at work and a high threat/high efficacy ("concerned and confident") EPPM profile distinguished those who were more likely to voluntarily report to duty.
Barnett et al. (2012)	Survey of 2993 local public health workers in U.S.	Multiple incidents	Willingness rates: Pandemic influenza (91.0%); weather-related (92.7%); dirty bomb (74.3); deliberate anthrax (80.3%). Rural respondents had higher rates of willingness than urban respondents. Willingness rates were higher 'if required' than 'if asked but not required'.
Basta, Edwards & Schulte (2009)	Survey of 2414 public health departmen t employees in U.S.	Influenza pandemic	Willingness to respond decreased with the progression of the pandemic and when the job required face-to-face contact with people who could be infected. During the early pandemic, 92.3% were very/somewhat likely to report if performing low-risk jobs duties and 66.4% were very/somewhat likely to report during the early pandemic if required to perform high-risk job duties.
Burke et al. (2011)	Survey of 877 paediatric healthcare employees in U.S.	Man-made/ natural disaster	Of the 672 employees who completed the willingness questions, 47% were willing to respond in the event of either a man-made or natural disaster. Being male and not being married/living with partner were more likely to be willing to respond. Physicians were the most willing to respond as compared to nurses.

Reference	Method	Scenario(s)	Key willingness findings
Butsashvili et al. (2007)	Survey of 288 healthcare workers in Georgia	Influenza pandemic	76% reported that they would continue to report to work when the incidence of infection in HCWs was twice that of the general population. Females were more likely to report discontinuation of work compared to males; however, the strength of this association substantially reduced when examining physicians' responses only.
Considine & Mitchell (2009)	Survey of 64 emergency department nurses in Australia	Multiple incidents (CBR)	Willingness rates: Chemical (78.1%); biological (84.4%); radiological (75.0%). There was a positive association between willingness to participate in CBR incidents and postgraduate qualification in emergency nursing For chemical incidents, there were weak positive correlations between training adequacy and both willingness to participate, but this did not apply to biological or radiological incidents. Study had small sample.
Crane et al. (2010)	Survey of 2279 healthcare providers in U.S.	Bioterrorism	The majority of respondents were willing to respond to both a high-risk (HR) event and a low-risk (LR) event within their local community (81.7 and 82.8% respectively). These rates reduced for events that were regional (64.4% and 68.8% respectively), statewide (53.6% and 35.8% respectively), and nationwide (48.2% and 47.0% respectively).
Damery et al. (2009)	Survey of 1032 healthcare workers in U.K.	Influenza pandemic	Factors with the greatest potential impact on likelihood of working were 'illness to children' (13% likely to work) and illness to partner (23% likely to work). Females were significantly less likely to work during a pandemic than males, part time workers less likely than full time workers and those with caring responsibilities less likely than those without. Those who lived alone or who shared with friends were more likely to report to work than those who lived in households with children. Females were significantly less likely than males to work if children were ill.
Damery et al. (2010)	Survey of 1032 healthcare workers in U.K.	Influenza pandemic	Those respondents who agreed that all healthcare workers have a duty to work were significantly more likely to report that they would work than those who disagreed. Those who agreed that doctors and nurses have a duty to the sick were over four times more likely to work than those who disagreed. Those agreeing that their main responsibility was to themselves and their family were significantly less likely to work than those who disagreed. Appears to be the same study as above.

Reference	Method	Scenario(s)	Key willingness findings
Daugherty et al. (2009)	Survey of 256 ICU healthcare workers in U.S.	Influenza pandemic	21% of critical care HCWs reported that they were either unsure about whether they would come to work during a pandemic or were unlikely to do so. No differences were found between HCWs in their likelihood of reporting to work, based on job title, hospital affiliation, or the respondent's degree of confidence in their knowledge of how to protect themselves.
DiGiovanni et al. (2003)	Survey (with video scenario) of 153 community residents in U.S.	Rift Valley Fever Virus (bioterrorism)	Four groups were studied: Medical first responders, their spouses/partners, journalists and others (residents). Most participants in all groups indicated they would remain on the job throughout the crisis. After the disease was identified, and recognized as bioterrorism, 95% of responders, 71% of media and 65% of residents said they would continue working, and 78% of spouses said they would want their first responder partners to remain on the job.
DiMaggio et al. (2005)	Survey of 823 emergency medical technicians (EMT) in U.S.	Multiple terrorist incidents	Willingness to report to work: Snowstorm (84.1%); smallpox (64.8%); chemical attack (74.3%); explosions(87.7%); landfill fire (87.5%); dirty bomb (73.6%). 'Sense of responsibility' (83.3%), 'ability to provide care' (77.3%) and 'code of ethics' (69.9%) most frequently selected reasons by those willing to respond.
Ehrenstein et al. (2006)	Survey of 644 hospital employees in Germany	Influenza pandemic	52% disagreed that it would be professional acceptable for healthcare professionals (HCP) to abandon their workplace during a pandemic to protect themselves and family. Disagreement was higher for physicians (65%) than administrators (32%). 77% disagreed that HCP should lose their jobs for not reporting to work.
Garrett, Park & Redlener (2009)	4 focus groups followed by survey of 2864 hospital workers in U.S.	Influenza pandemic	Single most significant barriers to employees were: Concern for safety of family (25.03%); personal safety concern (18.03%); and dependent childcare needs at home (16.17%). Mitigation strategies including preferential access to antiviral medication and PPE for employee and immediate family resulted in an increase in willingness to work scores.
Gershon et al. (2007)	Survey of 1025 home healthcare workers in U.S.	Serious infectious disease	Majority of home healthcare workers (51%) reported that they would not provide care for a client who was in quarantine because of exposure to a serious infectious disease (e.g. anthrax, avian flu).
Gershon et al. (2009a)	Survey of 384 home healthcare workers in U.S.	Influenza pandemic	43% would be willing to take care of their current patients, but this reduced to 27% for new patients who were infected. Most common barrier to willingness was fear for self and family's safety. Facilitators for willingness were being given a vaccine, being confident a mask would protect them and if their family was guaranteed to get the vaccine quickly.

Reference	Method	Scenario(s)	Key willingness findings
Gershon et al. (2009b)	Survey of 129 emergency medical services personnel in U.S.	Influenza pandemic	Willingness to report to duty during a pandemic increased from 63% at the pre-test stage (before the pandemic preparedness training, which involved an educational intervention and a skill-based drill with respiratory PPE) to 66% at the post-test stage (after the pandemic preparedness training). Training was effecting at increasing pandemic knowledge and behavioural intentions with respect to use of respiratory PPE and seasonal influenza vaccination.
Gershon et al. (2010)	Survey of 1103 essential workers (e.g. HCWs, police personnel, fire personnel)	Serious pandemic event	65% willing to report to work compared to 80% able to report to work. Group most able and willing to report to work was department of health workers (59%) and least able and willing were the corrections workers (37%). Organisational trust/shared values, two or more workplace pandemic preparedness elements, less concern that a pandemic might occur within the next 5-10 years and pandemic influenza training were all significantly associated with willingness to work.
Goodhue et al. (2012)	Survey of 2627 paediatric nurse practitioners (PNPs) in U.S.	Multiple incidents	Willingness rates: Disaster in general (26.75%); biological event (25.88%); terrorist attack (26.71%). Fewer than 10% of PNPs felt 'definitely prepared' for either a disaster in general or natural disaster and were willing to respond. PNPs who felt definitely prepared for a disaster in general were 4.2 times more likely to be willing to respond than were PNPs who did not feel prepared. Significant predictors of responding included being male, having military experience, and disaster training. The most significant factor was having a specified role in the workplace disaster plan.
Grimes & Mendias (2010)	Survey of 292 nurses in U.S.	Bioterrorism	Nurses' intention to respond was higher in scenarios where the infection risk was lower. Overall intention to respond scores were positively related to bioterrorism knowledge and having had previous emergency and disaster experience. Being less likely to respond was associated with having dependent children and more years in nursing.
Gullion (2004)	Survey of 111 school nurses in U.S.	Bioterrorism	When asked how willing they would be to care for infected smallpox patients if they themselves were unvaccinated, 47.5% answered 'not at all'. When asked how willing they would be to care for a patient infected with communicable respiratory infection, such as SARS or pneumonic plague, 20.2% answered 'not at all'

Reference	Method	Scenario(s)	Key willingness findings
Hogg et al. (2006)	Survey of 246 family physicians in Canada	Infectious disease outbreaks/ public health emergencies	More than 75% of physicians were willing to be contacted on an urgent basis in the event of a public health emergency and to help according to their capacity. 21% said they would not be willing to be contacted. Out of those who were willing, 94% said they would assist in immunisation clinics and 84% in antibiotic clinics.
Hope et al. (2010)	Survey of 868 front line health staff in Australia	Multiple incidents	Willingness rates: Weather related event (78%); influenza pandemic (67%); bioterrorism event (52%). Willingness did not differ by clinical status or professional classification. Rural respondents were more likely to be willing than urban respondents during a weather related or bioterrorism event. Factors associated with willingness in all three scenarios were: perceived confidence in own skills, likelihood of being asked to respond and family preparedness.
Irvin et al. (2008)	Survey of 169 hospital personnel in U.S.	Avian influenza pandemic	50% reported being willing to work if patients with avian flu were being treated at the hospital. Doctors were more likely to be willing than nurses or clerical/other associates. For those who answered 'maybe' and also answered the questions about incentives, the most important factor was their confidence that the hospital could protect them (83%).
Ives et al. (2009)	Qualitative study (interviews and focus groups) of 64 healthcare workers in U.K.	Influenza pandemic	HCWs tended to feel motivated by a sense of obligation to work through an influenza pandemic, and this was evident across all job categories. This was separated by the researchers into 'a professional ethic', 'a duty to help' and 'a work ethic and confederate loyalty.' Barriers to willingness to report to work included: prioritising the wellbeing of family members; lack of trust in, and goodwill towards, the NHS; a lack of information about the risks and what is expected of them during the crisis; fear of litigation; and the feeling that employers do not take the needs of staff seriously.
Kaiser et al. (2009)	Survey of 523 medical students in U.S.	Multiple incidents	Willingness rates for being asked to report but not required: Natural disaster 96%; pandemic influenza 93.7%; radiological event 83.3%. When asked their level of agreement to the statement 'I would be willing to respond regardless of severity' the rates reduced to: Natural disaster 92.5%; pandemic influenza 87.8%; radiological event 74.6%.
Katz et al. (2006a) (abstract only)	Survey of 133 dentists in U.S.	Bioterrorism	73.8% expressed willingness to provide assistance to the state of Hawaii in the event of a bioterrorist attack. 9.2% indicated they were able to respond effectively to a bioterrorist attack.

Reference	Method	Scenario(s)	Key willingness findings
Katz et al. (2006b)	Survey of 115 physicians and 146 nurses in U.S.	Bioterrorism	74% of responding physicians expressed willingness to provide assistance to the state of Hawaii's bioterrorism response and control efforts; 13% indicated that they were able to effectively respond to a bioterrorism attack. 74% of nurses expressed willingness to provide assistance to the response; 11% indicated that they were able to respond effectively to a bioterrorist attack.
Kim et al. (2006)	Survey of 679 clinical nurses in Korea	SARS	Descriptive statistics indicated that the respondents were neutral in their intention to care for SARS patients. Study used theory of planned behaviour. Factors found to have a significant relationship with intention to care for SARS patients were: attitude towards SARS-patient care, subjective norm (perceived dis-/approval of significant others), and perceived behavioural control.
Ko et al. (2004)	Survey of 750 nurses in China	SARS	Survey was completed after the SARS outbreak. 42.7% of nurses had a positive intention to provide care to SARS patients and 25.4% would volunteer to care for a SARS patients. Factors predicting intention to care for SARS patients were self-efficacy (confidence in their ability to care for SARS patients), attitude towards caring for SARS patients, years working at the hospital, and receiving resources from the hospital. Study used theory of planned behaviour.
Lenaghan et al. (2006)	Survey of 573 Medical Centre staff/physicians in U.S.	Bioterrorism	86.5% said they would report to work if a chemical nerve agent was suspected in the city (61% definitely report, 25.5% possibly report). 90% of staff would report to work if a smallpox patient were admitted to the hospital, however only 6% would report if they had not had a vaccine.
Mackler, Wilkerson & Cinti (2007)	Survey of 95 paramedics in U.S.	Smallpox	If no vaccine was available and paramedics had no protective gear then 4% said they 'probably' would remain on duty and none 'definitely' would remain on duty, this increased to 44% definitely and 39% probably if protective gear was available and if it was guaranteed that a vaccine would be available within 4 days. Being younger, male, not married and having no children under the age of 18 were associated with greater likelihood of remaining on duty. Study had small sample.

Reference	Method	Scenario(s)	Key willingness findings
Martin (2011)	Survey of 735 nurses in U.S.	Influenza pandemic	90.1% were willing to work during pandemic flu and 83% felt knowledgeable enough to safely care for pandemic flu patients. When offered full PPE (gloves, gown, N-95 mask) 92.5% were willing to care for pandemic flu patients, but this reduced to 53.9% when a gown was not available. When only a surgical mask was available 14.2% would be willing to provide care. Providing both antiviral medication and vaccine to nurse and their family resulted in the highest willingness to work (89.5%).
Martinese et al. (2009)	Survey of 560 hospital staff in Australia	Single case of avian influenza/pandemic	13% would not attend work if there was a single case of avian influenza admitted to the hospital. Of the rest, 25% would not work until specific antiviral preventative measures were provided. If there were multiple admissions of human influenza, indicating a pandemic, 36% of staff would not report to work. Of the rest, a further 17% would not work without antiviral preventative measures. For 70-80% of staff the main reasons for not working were concerns for their own health and concerns for their family's health. Most important incentives to work were full preventative measures for staff and provision of alternative accommodation for staff.
Masterson et al. (2009)	Survey of 204 emergency dept. personnel in U.S.	Multiple incidents	Willingness to work additional hours for victims of: an airplane crash 98%; a radioactive bomb 85.3%; biologic agent 54%. Men were significantly more likely to respond in an incident involving a biologic agent than women. Disability coverage, increased pay and increased compensation time were the incentives found to be most influential on an employee's willingness to respond.
Mortelmans et al. (2009)	Survey of 243 senior medical students	Avian influenza	82.3% reported being willing to care for pandemic patients if necessary, however this reduced to 41.2% when the patients were children. Only 18.9% considered themselves to be sufficiently educated regarding H5N1.
Ogedegbe et al. (2012)	Survey of 5790 hospital employees in U.S.	Disaster	93% willing to report for duty in the event of a disaster and understood why they might be required to work overtime. Most common personal responsibilities endorsed as barriers were 'caring for children' and 'pets'. Significant predictors of willingness were being in an older age group, and having eldercare obligations. Years of service and job type were not related to willingness.
Qureshi et al. (2005)	Survey of 6428 healthcare workers in U.S.	Multiple incidents	Willingness rates: Snow storm 80%; mass casualty incident 86%; environmental disaster 84%; chemical event 68%; smallpox epidemic 61%; radiological event 57%; SARS outbreak 47%. Correlates of being less willing to report to work for most events: Being female; having childcare and eldercare obligations.

Reference	Method	Scenario(s)	Key willingness findings
Seale et al (2009)	Survey of 1079 hospital staff in Australia	Influenza pandemic	83.3% would present to work if a patient in their ward/department had an influenza-like illness. 79% would present to work if a colleague had contracted pandemic influenza. 60.6% would present to work if a family member had an influenza-like illness. 81.2% would not present to work if they themselves had influenza symptoms, and 53.4% would still not even if there was a severe staff shortage.
Seale et al (2012)	Survey of 1909 healthcare workers in China	Influenza pandemic	86% indicated that they would report to work if a patient in their ward/department had an influenza-like illness. 81% would report if a colleague had contracted influenza. 71% would present if a family member had an influenza-like illness. 62% would report to work if there was a staff shortage and they themselves had symptoms of influenza. 74% accepted the risk of getting pandemic influenza as part of their job, but 85% of doctors and 86% of nurses were afraid of transmitting it to their families.
Shabanowitz & Reardon (2009)	Survey of 908 healthcare workers in U.S.	Avian influenza	60.7% disagreed with the statement that it was ethical for healthcare workers to abandon their workplace during a pandemic in order to protect themselves and their families (24.9% agreed), however 64.5% agreed that healthcare workers should be allowed to decide whether they report to work during a pandemic. 21% said they would not volunteer even if they were provided with the following: hazard pay; PPE and training; specialized infectious disease training; life/disability insurance coverage for family; additional support for personal/family needs; and being the first to receive antiviral drugs and a vaccine if one became available.
Shapira et al. (1991) (abstract only)	Survey of approx. 1350 hospital staff in Israel	Unconventional missile attack	42% were willing to report to their duties, however this increased to 86% if safety measures were provided. Most willing to report to work were males, personnel with headquarter duty of hospital site managers and parents of children over 14yrs old.
Shaw et al. (2006)	Semi-structured interviews with 60 GPs in Australia	Influenza pandemic	The GPs in the study said they would continue to work during a pandemic and that declining to work would be unethical. GPs had a strong personal work ethic and had a sense of responsibility for their patients' welfare. 55 out of the 60 GPs said they would stop working if PPE were unavailable, due to concerns for their own welfare and also the welfare of their dependents if they were to die. If public health authorities recommended that essential services receive prophylactic antivirals then most GPs would take them and would also want them for their families.

Reference	Method	Scenario(s)	Key willingness findings
Smith et al. (2009)	Qualitative study (focus groups and interviews) of 58 paramedics in Australia.	Multiple incidents (train derailment; explosion (CBR); avian influenza.)	The way paramedics perceived risk was directly influenced by the type of incident and the potential for it to impact on their family. Concerns about threats to health and wellbeing of self, colleagues and family were frequently mentioned. Paramedics also reported their desire to fulfill their professional responsibilities. Majority of participants willing to report to work during conventional disasters; however willingness decreased for situations non-conventional and less visible. Perception of risk increased (and willingness decreased) the longer a disaster situation lasted for. Some paramedics said they would self-impose quarantine if they were required to work during a health related or non-conventional disaster.
Smith & Walton (2009)	Survey of 190 staff in a local government organisation in New Zealand.	6.8 magnitude earthquake	Overall responsibility in the organization affected attitudes to returning to work the most, and having dependents had less effect than the researchers expected. Staff who were not perceived to be as important were more likely to show a preference towards home responsibilities, or to feel they would be in the way and would be better to stay away. Study used Social Network Analysis.
Stergachis et al. (2011)	Survey of 4306 healthcare workers in U.S.	Multiple incidents	Willingness rates: Influenza pandemic 89%; severe earthquake 88%. Most frequently reported barriers for influenza pandemic were fear or concern for their family, fear or concern for themselves and personal health problems. For earthquake scenario most frequently cited barriers were transportation problems and fear or concern for family and self. For those respondents with children under 18 living at home, childcare obligations were a frequently cited barrier to reporting to work in both scenarios.
Syrett et al. (2007)	Survey of 186 emergency healthcare personnel in U.S.	Bioterrorism	Before the nature of the incident was known (scenario described vague presentations that would typical of an influenza-like illness outbreak) less than 80% would report to work. When healthcare workers fell ill that rate reduced to 55%. Once the agent was identified there was a significant decrease in willingness to respond. When the agent was identified as being transmissible and there were only experimental treatments available the response rate was less than 40%.
Tam et al. (2007)	Survey of 999 nurses in Hong Kong	Avian influenza	81.6% would not consider a job change or resigning even if they were required to take care of patients with the infection, even though 69.4% reported being afraid of falling ill with the infection. 72.7% accepted a personal risk of avian influenza infection in the course of their work and 84% were prepared to take care of patients infected with the virus.

Reference	Method	Scenario(s)	Key willingness findings
Tippett et al. (2010)	Survey of 725 emergency prehospital medical care providers in Australia	Influenza pandemic	56.3 reported that they would be willing to work during pandemic conditions. 75% would be prepared to wear PPE and 47.5% would be willing to change role. One third would refuse to work with a colleague exposed to a known case of pandemic human influenza and one quarter would refuse to work with a colleague exposed to suspected influenza. Increased willingness was associated with high confidence in employer and perceived adequate education/training on infectious disease generally. NB: Data was collected in 2006.
Tzeng & Yin (2006)	Survey of 225 nurses in Taiwan	Avian influenza	58.7% of nurses thought that if an outbreak of avian flu occurred (with human to human transmission) their hospital would not have sufficient infection control measures. 56.9% indicated they were willing to care for patients with avian influenza.
Veenema et al. (2008) (abstract only)	Survey of 668 nurses in U.S.	Radiological emergency	Baseline knowledge, clinical competence and perception of personal safety were all positively associated with willingness to respond. Perception of personal safety was the primary determinant.
Wong et al. (2008a) (abstract only)	Survey of 1859 healthcare workers in Singapore	Avian influenza	71.9% accepted the risk to their health from their occupation and the risk of falling ill with avian influenza, but 25.5% felt they should not be looking after avian influenza patients. 15% would consider resigning. 63.5% felt that people would avoid them during a pandemic and 54.1% felt that people would avoid their families.
Wong et al. (2008b) (abstract only)	Survey of 285 primary care physicians in Singapore	Avian influenza	82.5% accepted the risk to their health from their occupation and falling ill with avian influenza. 11.8% would consider stopping work. 69.9% felt that people would avoid them during a pandemic and 54.1% felt that people would avoid their families.
Wong et al. (2010)	Survey of 267 community nurses in Hong Kong	H1N1 influenza pandemic	76.9% reporting that they were not willing to take care of patients during H1N1 influenza pandemic. The reasons for being unwilling were: psychological stress (55%) and fear of being infected (29.2%). 74.5% wanted more training and professional education regarding how to deal with H1N1 influenza.
Yonge et al. (2010).	Survey of 484 nursing students in Canada	Influenza pandemic	67.9% said they were likely to volunteer if they were healthy and able. This is increased to 77.4% if they were provided with protective garments. 55.6% said they would volunteer if compensated and 50% said they would volunteer if conscripted by the government.

Reference	Method	Scenario(s)	Key willingness findings
Young & Persell (2004)	Survey of 95 nursing students in U.S.	Multiple CBRN incidents	90% of students were not willing to work with contagious clients if transmission to family was possible and there was no prophylactic help to their family. Willingness rates increased when prophylactic vaccine or antibiotics were available. Study had small sample.

Appendix B: Interview schedule

Introduction to interview

Thank you for agreeing to take part in this interview. In this study we are interested in exploring business continuity after disruption, specifically after Chemical, Biological, Radiological, Nuclear or explosive incidents (CBRNe). There are no right or wrong answers to these questions. We do not expect you to be experts about these incidents. We are simply interested in your views and your likely reactions to these types of events.

Before we start, do you have any questions?

Do you mind if I record this interview? As noted on the information sheet, the audio recording will be destroyed after the interview is transcribed, and any quotes used in the report or future publications will be completely anonymous. You are free to leave this interview whenever you wish.

Questions and Prompts

Can I ask you to tell me a little bit about you role?

How does your organisation plan for disruption *(scenario planning or impact-based planning)*

Can you list some of the other types of incidents that you exercise for?

How important do you think it is for your organisation to keep functioning during an incident? I mean in terms of keeping the country running. *Why is it so important?*

Thinking about the average employee of this organisation, how much involvement do they have in the business continuity planning?

Were you involved in the creation of your organisation's Business Continuity Plan?

- *If yes, what was/is your role?*

What types of incidents does your organisation's Business Continuity Plan include?

What types of incident do you think your organisation is not prepared for?

- *What would happen to the organisation if this kind of incident occurred? (The business and the individual employees)*

- *What additional incidents do you think the organisation should prepare for? Why?*

Do you plan for CBRN incidents? How*?*

Can you tell me a bit about any incidents that have occurred and how your organisation responded to them? *E.g*. *Swine flu, July 7th, September 11th, Fire, Flooding, Snow.*

How do you include staff concerns in business continuity planning?

How do you expect your staff to react to an extreme event? To a CBRN incident? *Would they come to work?*

Have you considered situations where staff might be unwilling to report to work? How would you deal with that? Have you experienced any unwilling staff in the past?

What do you think might prevent staff from reporting to work?

How would the organisation help staff to report to work? *Practical interventions? Medication?*

Do you have any psychological interventions in place?

Can you tell me a bit about how you communicate with staff during an incident?

Who would communicate with staff during an incident? *Who would tell staff it was safe to come to work?*

Do you have any thoughts or experience related to the use of social media during an incident?

Do you have any other comments or points you think are relevant to this discussion? Do you have any questions for me?

Thank you for taking part in this interview. If you do think of any questions or comments for me later on, then feel free to contact me on the email address provided on the information sheet.

Appendix C: Full list of survey questions and recoding information

We are conducting an online survey as part of a PhD project which takes about 15-20 minutes to complete. The aim of the research is to examine the likely behaviour of employees during times of disruption, particularly in the event of a high impact extreme event (including incidents with a CBRN - chemical, biological, radiological, nuclear or explosive - or other hazardous materials element).

We'd like you to fill in this survey if you are over 18 and currently working in the UK.

Before we go on, there are some points we would like to make sure you are aware of:

- We would like to assure you that all of the information we collect will be kept in the strictest confidence and used for research purposes only. It will not be possible to identify any individual in the reporting of the results.
- We may share the findings from this survey with other research teams who are interested in this topic. If we do this, no individual will be identifiable from the data. Anonymised results may also be published in academic journals, practitioner publications and books.
- Participation in this survey is entirely voluntary and you can withdraw from it at any time without giving a reason up until the point of submission. Submission of a completed survey implies consent to participate.
- As participation is anonymous it will not be possible for us to withdraw your data once you have submitted your questionnaire.
- Data collected in this survey will be treated in accordance with the Data Protection Act 1998.

Finally, if you would like to speak to someone about this survey, in the first instance you should contact the lead researcher Lorna Riddle (lorna.riddle@phe.gov.uk) or the research supervisors Dr. Brooke Rogers (brooke.rogers@kcl.ac.uk) and Dr. Richard Amlôt (richard.amlot@phe.gov.uk).

1. Please indicate that you have read the information on this page and are happy to take part in this study:
    - Yes – I consent to taking part in this study
    - No – I do not consent to taking part in this study

2. Are you currently over 18 AND in paid employment in the UK?
    - Yes
    - No

3. Are you currently registered as a full time student?
    - Yes
    - No

4. How many hours a week do you work on average?

5. What is your specific role/profession and in which industry? Please describe what you do as best you can. For example: Personal assistant in a retail organisation; bank branch manager; teacher; shop assistant; project manager for an IT firm; fundraiser for a charity; waitress etc.

6. Does the organisation you work for operate in any of the following sectors of national infrastructure? (You can select more than one if applicable)
    - Communications (e.g. landline/mobile telephone networks and internet)

- Emergency services
- Energy
- Financial services
- Food
- Government
- Health
- Transport
- Water
- It does not operate in any of these sectors
- Don't know

7. Is the organisation you work for in the public or private sector?

- Public sector
- Private sector
- Both public and private sector
- Not-for-profit sector
- Not sure
- Other, please specify

8. Roughly how many people are employed by the organisation you work for?

- 1 – I am the only employee
- More than 1 but less than 10
- More than 10 but less than 100
- More than 100 but less than 1000
- More than 1000
- I don't know

9. Where in the UK is the location of your usual workplace?

- East Midlands
- East of England
- Greater London
- North East England
- North West England
- South East England
- South West England
- West Midlands
- Yorkshire and the Humber
- Scotland
- Wales
- Northern Ireland

10. Which of these methods of transport do you usually use to get to your usual place of work? Please select all methods that you use.

- Car (not taxi)
- Train
- Underground
- Bus
- Walking
- Bicycle
- Motorbike/Moped
- Tram
- Taxi

- I do not travel to get to work
- Other, please specify

11. How long does it take you to get to work on an average day?

- I have no commute because I usually work from home
- Up to 30 minutes
- 30 minutes to 1 hour
- 1 to 2 hours
- Over 2 hours
- Other, please specify

12. Which of these best describes your usual place of work?

- Office
- Home
- Shop/branch
- School
- Other, please specify

13. How many people at work report directly to you?

14. How long have you worked for your present employer?

15. Ideally how long do you plan to stay working for your current organisation? (Please choose the option that best applies to you?

- I have given in my notice
- Less than a year
- More than 1 year but less than 5 years
- More than 5 years but less than 10 years
- More than 10 years
- Until I retire

16. Are you self-employed and/or do you own your own business?

- Yes
- No

17. Have you ever had a resilience/business continuity/crisis management/emergency planning or related role?

- Yes – my current role
- Yes – a previous role
- No – never
- If unsure, please provide details of role here:

18. Have you ever received any business continuity or crisis management training?

- Yes – at a current organisation
- Yes - at a previous organisation
- No – never
- If unsure, please provide details of training here:

19. Are you well informed about the business continuity arrangements/plans at the organisation where you currently work? i.e. the plans for how an organisation would return to normal after disruption

- Yes - I am fully informed

- Yes - but I only know some details
- I am aware they exist but I don't know any details
- No – I don't know if the organisation has any business continuity arrangements/plans
- No – the organisation does not have any business continuity arrangements/plans

20. Thinking about the organisation you currently work for, please indicate your level of agreement to the following statements: [Likert scale: 1 = Strongly agree, 7 = Strongly disagree]

- All in all I am satisfied with my job
- In general, I don't like my job

21. Thinking about the organisation you currently work for, please indicate your level of agreement to the following statements: [Likert scale: 1 = Strongly agree, 5 = Strongly disagree]

- When someone criticises the organisation I work for, it feels like a personal insult
- I am very interested in what others think about the organisation I work for
- When I talk about the organisation I work for, I usually say 'we' rather than 'they'
- This organisation's successes are my successes
- When someone praises the organisation I work for, it feels like a personal compliment
- If a story in the media criticised the organisation I work for, I would feel embarrassed

22. How often does your supervisor or manager consider your views?

- Often
- Sometimes
- Rarely
- Never
- N/A – I don't have a supervisor/manager

23. How often are you involved in conflicts with colleagues at work?

- Often
- Sometimes
- Rarely
- Never
- N/A - I work alone

24. How often do you feel uneasy about going to work?

- Often
- Sometimes
- Rarely
- Never

25. Are you aware of any workplace bulling? (where you currently work)

- Yes
- No

26. Please indicate your level of agreement to following statements: [Likert scale: 1 = Strongly agree, 9 = Strongly disagree]

- The health and safety of staff is a high priority with management where I work
- I believe management where I work would put the continuation of business above my personal safety in the event of a serious incident

27. How secure do you feel in your job? (By secure it means not worrying about losing your job)

- Very secure
- Secure
- Insecure
- Very insecure

28. If for whatever reason you were to lose your current job, how easy do you think it would be for you to get another job?

- Very easy
- Fairly easy
- Neither easy nor difficult/not sure
- Fairly difficult
- Very difficult

29. How likely do you think it is that the following incidents will occur in an area close to your usual place of work? [Likert scale: 1 = Extremely likely to occur, 9 = Extremely unlikely to occur] [Order of incidents was randomised for each respondent]

- Pandemic flu (new virus strain)
- Bomb/explosive device
- Nuclear incident
- Severe snow
- Deliberate release of smallpox virus
- Severe flooding
- Dirty bomb (bomb that contains radioactive material)
- Chemical warfare agent release
- Accidental chemical spill or leak
- Deliberate release of pneumonic plague

30. If the following incidents were to occur in an area close to your place of work, how likely would they be to cause severe public health consequences? [Likert scale: 1 = Extremely likely, 9 = Extremely unlikely] [Incidents same as Q29]

31. If the following incidents were to occur in an area close to your place of work, how likely would they be to put your own health at risk? Likert scale: 1 = Extremely likely, 9 = Extremely unlikely] [Incidents same as Q29]

32. Which of these factors do you think could potentially prevent you from reporting to your usual place of work in the event of a serious incident? (i.e. in such incidents as the ones listed in the previous section) Please select as many as apply.

- Childcare responsibilities
- Eldercare responsibilities
- Transport problems
- If I had a lack of knowledge about the specific incident
- Fear for my own health or safety
- Fear for my significant others' health or safety
- Stress/anxiety
- I don't care about my job that much
- Not sure
- I volunteer at another organisation
- Other, please specify

33. Which of these factors do you think could potentially motivate you to report to your usual place of work in the event of a serious incident? (i.e. in such incidents as the ones listed in the previous section) Please select as many as apply.

- Because it is my duty to report to work
- Because my colleagues would report to work, therefore so should I
- Because my colleagues might not report to work, therefore I should
- Because I get paid to go to work
- Because I would want to carry on as normal
- Because I would want to be around colleagues for support
- Because I would be concerned about losing my job if I didn't report to work
- If I was provided with an extra financial incentive
- If I felt I had enough knowledge about the incident
- If my organisation kept me up to date with frequent communication
- Not sure
- Other, please specify

34. Please indicate your level of agreement to the following statements: [Likert scale: 1 = Strongly agree, 9 = Strongly disagree]

- If I can continue to work in the event of a serious incident it will make a big difference to the organisation I work for
- If my organisation can continue to function in the event of a serious incident it will make a big difference to keeping the country running

35. Thinking about the organisation you currently work for, please indicate your level of agreement to the following statements: [Likert scale: 1 = Strongly agree, 5 = Strongly disagree]

- I believe my organisation has taken steps to find out what might prevent staff from reporting to work during a serious incident
- During a serious incident my organisation wouldn't be interested in why I wasn't willing to come to work, only that I wasn't at work

36 – 37. For the next set of questions we would like you to imagine that the incident has occurred in (or is affecting) an area close to your usual place of work. For each incident please indicate your ability and willingness to report to your usual place of work. By 'ability' to report to work, we mean whether you are capable of getting to work and performing your duties. By 'willingness' to report to work, we mean whether you voluntarily intend to report to work. [Incidents same as Q29]

Please select one response from each section:

- Able
- Not able
- Not sure

AND

- Willing
- Not willing
- Not sure

38. If your normal workplace was inaccessible, would you be able to work from home? i.e. is your job something you can do from home and be reasonably productive? For example, a taxi driver could not work from home if the taxi or roads were inaccessible.

- Yes - I could work from home
- Yes - I could work from home, but only for a few days
- No - my job is not something I could do from home
- I don't know
- Other, please explain

39. Thinking about a situation where your normal workplace was inaccessible, please answer the following questions. (Please answer N/A if your job means you cannot work from home) [Options: Yes; No; Not sure; N/A]

- Would you be willing to work from home if your normal workplace was inaccessible?
- Would you have all the equipment/resources you needed to be able to work from home?
- Would it have been necessary for you to have brought some equipment (e.g. laptop, remote access token) home with you the previous day?
- If you require a remote access token and/or laptop to connect from home, do you take this equipment home with you each day or keep it at home? (please answer N/A if you would not need to use this equipment to work from home)
- Would you only be able to work from home if you had a working internet connection and/or phone?

40. In the last 12 months, approximately how many times have you worked from home? (Please select the option that best applies to you)

- Every day
- Once a week
- Once every 2 weeks
- Once a month
- On 5 or less separate occasions
- Never (but I could have if I'd needed/wanted to)
- Never (my job is not something I can do from home)
- Never (my organisation does not allow working from home)
- Other, please specify

41. Age:

42. Gender:

43. Number of children under the age of 18:

44. Number of children under the age of 5:

45. Household composition:

- I live alone
- I live with my spouse/partner
- I live with my children (who are under the age of 18)
- I live with my children (who are 18 or older)
- I live my parents or extended family
- I live with others (not relations)
- Other, please specify

46. Are you currently expecting a baby?

- Yes – I am pregnant
- Yes – I am a father to an unborn baby
- No

47. Do you have elderly family members or family members with disabilities who rely on you for care?

- Yes
- No

48. What is the highest level of education you have achieved to date?

- GCSE/O-Level/CSE
- Vocational qualifications (=NVQ1+2)
- A-Level or equivalent (=NVQ3)
- Bachelor Degree or equivalent (=NVQ4)
- Masters/PhD or equivalent
- No formal qualifications
- Other

49. What is your current salary?

- Up to £10,000
- Over £10,000 but less than £20,000
- Over £20,000 but less than £30,000
- Over £30,000 but less than £50,000
- Over £50,000 but less than £75,000
- Over £75,000
- Prefer not to say

50. In general, how would you rate your overall health?

- Excellent
- Very good
- Good
- Fair
- Poor

51. Do you have any chronic (long-standing) illness, disability or infirmity?

- Yes
- No
- Not sure

52. Please indicate how often the following apply to you: [Likert scale: 1=Very often, 5 = Not at all]

- How often do you do dangerous things for fun?
- How often do you do exciting things, even if they are dangerous?

53. Please indicate how true the following statements are for you: [Not true at all; Rarely true; Sometimes true; Often true; True nearly all of the time]

- I am able to adapt to change
- I tend to bounce back after illness or hardship

54. Would you say that filling in this survey has made you feel at all upset? Note: If you answer yes, please feel free to contact the lead researcher (contact details on the next page)

- Yes
- No

Recoding information

Age was recoded into '18-24', '25-43', '35-44', '45-54' or '55+'; Education was recoded into 'GCSE/A Level or equivalent', 'Bachelor degree or equivalent' or 'Masters/PhD or equivalent' and those who selected 'other' and whose written response could not be grouped into one of the categories were counted as missing data; Salary was recoded into 'Up to £30k', 'More than £30k but less than £50k' and

'£50k or more', 'prefer not to say' was coded as missing data; Location of work was recoded into 'London' or 'Not London'; Children under 18 was recoded into 'Yes' or 'No'. Direct reports was recoded into 'Yes' or 'No'; Business Continuity role was recoded into 'Yes' or 'No'; Business Continuity training was recoded into 'Yes' or 'No'; General ability to work from Home was recoded into 'Able to work from home' and Not able to work from home'; Job security was recoded into 'Insecure' and 'Secure'; Ease of finding a new job was recoded into 'Easy' or 'Difficult', with the 'neither/not sure' category removed; for the working climate questions about their supervisor/manager considering their views, being involved in conflicts at work and feeling uneasy about going to work, responses were recoded into 'Often/Sometimes' and 'Rarely/Never', with the 'N/A' responses removed. The question about health was removed from the final odds ratio analysis due to a very low number of responses in two of the five categories ('Fair' and 'Poor') for which it was decided it was not appropriate to recode and include these in the remaining three groups ('Excellent', 'Very Good' and 'Good') as they are too qualitatively different. The results from the separate 'threat' and 'efficacy' items of the modified EPPM were summed to create the final 'threat' and 'efficacy' values. These were then dichotomised at the median to create low and high categories as per the method of Barnett et al.[693] Low 'threat' or 'efficacy' were calculated as less than or equal to the median, and high 'threat' or 'efficacy' were calculated as greater than the median. Each survey respondent was then put into one of the four EPPM categories: Low Threat Low Efficacy (LTLE), Low Threat High Efficacy (LTHE), High Threat Low Efficacy (HTLE) and High Threat High Efficacy (HTHE).

The outcome variable 'willingness to report to work' was dichotomised into those who said they would be 'willing' to report to work and those who said they were 'not willing' or 'not sure'. The predictor variable 'ability to report to work' for each incident was dichotomised the same way as the outcome variable into 'able' to report to work and perform their duties and those who said they were 'not able' or 'not sure'. This dichotomisation was employed in a similar way to the method of analysis employed by Qureshi et al., in their study of the correlates of the ability and willingness of healthcare workers to report to duty during catastrophic disasters; however for the present study only 'willingness' to work was used as the outcome variable.[694]

[693] Barnett et al., 'Assessment of Local Public Health Workers' Willingness to Respond to Pandemic Influenza'.
[694] Qureshi et al., 'Health Care Workers' Ability'.

Appendix D: Supplementary survey response tables

Table D1 Participants willing to work for each incident

Scenario	Number of participants willing to go to work/total sample (%)
Bomb/explosive device	166/312 (53.2)
Chemical warfare agent release	70/312 (22.4)
Accidental chemical spill or leak	177/312 (56.7)
Pandemic flu (new strain)	173/312 (55.4)
Deliberate release of the smallpox virus	91/312 (29.2)
Dirty bomb	69/312 (22.1)
Severe flooding	258/312 (82.7)
Deliberate release of pneumonic plague	75/312 (24.0)
Severe snow	276/312 (88.5)
Nuclear incident	76/312 (24.4)

Table D2 Participants able to work for each incident

Scenario	Number of participants able to go to work/total sample (%)
Bomb/explosive device	129/312 (41.3)
Chemical warfare agent release	96/312 (30.8)
Accidental chemical spill or leak	156/312 (50.0)
Pandemic flu (new strain)	196/312 (62.8)
Deliberate release of the smallpox virus	128/312 (41.0)
Dirty bomb	84/312 (26.9)
Severe flooding	116/312 (37.2)
Deliberate release of pneumonic plague	124/312 (39.7)
Severe snow	141/312 (45.2)
Nuclear incident	82/312 (26.3)

Table D3 Associations between demographic variables and willingness to work in the event of a bomb/explosive device

Demographic Variable	No (%) of participants	No (%) willing to go to work	X^2	p
Gender:			2.528	0.112
Male	156 (50)	91 (58.3)		
Female	156 (50)	77 (49.4)		
Age:			10.361	**0.035**
18-24	23 (7.4)	7 (30.4)		
25-34	138 (44.2)	70 (50.7)		
35-44	60 (19.2)	32 (53.3)		
45-54	56 (17.9)	35 (62.5)		
55+	35 (11.2)	24 (68.6)		
Children under 18:			1.422	0.233
Yes	86 (27.6)	51 (59.3)		
No	226 (72.4)	117 (51.8)		
Education:			3.810	0.149
GCSE/A Level or equivalent	56 (18.4)	24 (42.9)		
Bachelor degree or equivalent	131 (43.0)	76 (58.0)		
Masters/PhD or equivalent	118 (38.7)	66 (55.9)		
Health:			9.285	0.054 (but 2 cells had less than 5 with no Fisher reported)
Excellent	79 (25.3)	41 (51.9)		
Very good	144 (46.2)	86 (59.7)		
Good	74 (23.7)	31 (41.9)		

Demographic Variable	No (%) of participants	No (%) willing to go to work	X^2	p
Fair	14 (4.5)	10 (71.4)		
Poor	1 (0.3)	0 (0)		
Work location:			1.633	0.201
London	146 (46.8)	73 (50)		
Not London	166 (53.2)	95 (57.2)		
Salary:			3.667	0.160
Up to £30k	98 (32.6)	45 (45.9)		
More than £30k less than £50k	112 (37.2)	62 (55.4)		
£50k or more	91 (30.2)	54 (59.3)		

Table D4 Associations between demographic variables and willingness to work in the event of a chemical warfare agent release

Demographic Variable	No (%) of participants	No (%) willing to go to work	X^2	p
Gender:			0.663	0.415
Male	156 (50)	32 (20.5)		
Female	156 (50)	38 (24.4)		
Age:			3.776	0.437
18-24	23 (7.4)	2 (8.7)		
25-34	138 (44.2)	30 (21.7)		
35-44	60 (19.2)	14 (23.3)		
45-54	56 (17.9)	16 (28.6)		
55+	35 (11.2)	8 (22.9)		
Children under 18:				
Yes	86 (27.6)	22 (25.6)	0.675	0.249
No	226 (72.4)	48 (21.2)		
Education:			1.243	0.537
GCSE/A Level or equivalent	56 (18.4)	10 (17.9)		
Bachelor degree or equivalent	131 (43.0)	33 (25.2)		
Masters/PhD or equivalent	118 (38.7)	26 (22.0)		
Health:			5.868	0.209
Excellent	79 (25.3)	21 (26.6)		
Very good	144 (46.2)	37 (25.7)		
Good	74 (23.7)	10 (13.5)		
Fair	14 (4.5)	2 (14.3)		
Poor	1 (0.3)	0 (0)		
Work location:			2.451	0.117
London	146 (46.8)	27 (18.5)		
Not London	166 (53.2)	43 (25.9)		
Salary:			2.228	0.319
Up to £30k	98 (32.6)	18 (18.4)		
More than £30k less than £50k	112 (37.2)	30 (26.8)		
£50k or more	91 (30.2)	19 (20.9)		

Table D5 Associations between demographic variables and willingness to work in the event of an accidental chemical spill or leak

Demographic Variable	No (%) of participants	No (%) willing to go to work	X^2	p
Gender:			2.207	0.137
Male	156 (50)	82 (52.6)		
Female	156 (50)	95 (60.9)		
Age:			5.967	0.202
18-24	23 (7.4)	13 (56.5)		
25-34	138 (44.2)	77 (55.8)		
35-44	60 (19.2)	28 (46.7)		
45-54	56 (17.9)	34 (60.7)		
55+	35 (11.2)	25 (71.4)		
Children under 18:			0.508	0.476
Yes	86 (27.6)	46 (53.5)		
No	226 (72.4)	131 (58.0)		
Education:			2.899	0.235
GCSE/A Level or equivalent	56 (18.4)	30 (53.6)		
Bachelor degree or equivalent	131 (43.0)	82 (62.6)		
Masters/PhD or equivalent	118 (38.7)	62 (52.5)		
Health:			5.037	0.283
Excellent	79 (25.3)	47 (59.5)		
Very good	144 (46.2)	87 (60.4)		
Good	74 (23.7)	35 (47.3)		
Fair	14 (4.5)	8 (57.1)		
Poor	1 (0.3)	0 (0)		
Work location:			3.213	0.073
London	146 (46.8)	75 (51.4)		
Not London	166 (53.2)	102 (61.4)		
Salary:			1.279	0.528
Up to £30k	98 (32.6)	60 (61.2)		
More than £30k less than £50k	112 (37.2)	60 (53.6)		
£50k or more	91 (30.2)	51 (56.0)		

Table D6 Associations between demographic variables and willingness to work in the event of pandemic flu (new strain)

Demographic Variable	No (%) of participants	No (%) willing to go to work	X^2	p
Gender:			3.750	0.53
Male	156 (50)	78 (50)		
Female	156 (50)	95 (60.9)		
Age:			7.438	0.114
18-24	23 (7.4)	11 (47.8)		
25-34	138 (44.2)	71 (51.4)		
35-44	60 (19.2)	31 (51.7)		
45-54	56 (17.9)	34 (60.7)		
55+	35 (11.2)	26 (74.3)		
Children under 18:			0.469	0.494
Yes	86 (27.6)	45 (52.3)		
No	226 (72.4)	128 (56.6)		
Education:			5.225	0.073
GCSE/A Level or equivalent	56 (18.4)	30 (53.6)		
Bachelor degree or equivalent	131 (43.0)	82 (62.6)		
Masters/PhD or equivalent	118 (38.7)	57 (48.3)		
Health:			7.030	0.134
Excellent	79 (25.3)	47 (59.5)		
Very good	144 (46.2)	86 (59.7)		

Demographic Variable	No (%) of participants	No (%) willing to go to work	X^2	p
Good	74 (23.7)	35 (47.3)		
Fair	14 (4.5)	5 (35.7)		
Poor	1 (0.3)	0 (0)		
Work location:			4.179	**0.041**
London	146 (46.8)	72 (49.3)		
Not London	166 (53.2)	101 (60.8)		
Salary:			0.128	0.938
Up to £30k	98 (32.6)	54 (55.1)		
More than £30k less than £50k	112 (37.2)	64 (57.1)		
£50k or more	91 (30.2)	50 (54.9)		
Self employed/own business:			0.083	0.773
Yes	17 (5.4)	10 (58.8)		
No	295 (94.6)	163 (55.3)		

Table D7 Associations between demographic variables and willingness to work in the event of a deliberate release of the smallpox virus

Demographic Variable	No (%) of participants	No (%) willing to go to work	X^2	p
Gender:			0.16	0.901
Male	156 (50)	45 (28.8)		
Female	156 (50)	46 (29.5)		
Age:			3.419	0.490
18-24	23 (7.4)	6 (26.1)		
25-34	138 (44.2)	35 (25.4)		
35-44	60 (19.2)	17 (28.3)		
45-54	56 (17.9)	21 (37.5)		
55+	35 (11.2)	12 (34.3)		
Children under 18:			0.065	0.798
Yes	86 (27.6)	26 (30.2)		
No	226 (72.4)	65 (28.8)		
Education:			2.090	0.352
GCSE/A Level or equivalent	56 (18.4)	17 (30.4)		
Bachelor degree or equivalent	131 (43.0)	43 (32.8)		
Masters/PhD or equivalent	118 (38.7)	29 (24.6)		
Health:			7.224	0.125* 3 cells have expected count less than 5.
Excellent	79 (25.3)	23 (29.1)		
Very good	144 (46.2)	50 (34.7)		
Good	74 (23.7)	17 (23.0)		
Fair	14 (4.5)	1 (7.1)		
Poor	1 (0.3)	0 (0)		
Work location:			1.942	0.163
London	146 (46.8)	37 (25.3)		
Not London	166 (53.2)	54 (32.5)		
Salary:			0.211	0.900
Up to £30k	98 (32.6)	27 (27.6)		
More than £30k less than £50k	112 (37.2)	34 (30.4)		
£50k or more	91 (30.2)	27 (29.7)		

Table D8 Associations between demographic variables and willingness to work in the event of a dirty bomb

Demographic Variable	No (%) of participants	No (%) willing to go to work	X^2	p
Gender:			0.19	0.891
Male	156 (50)	35 (22.4)		
Female	156 (50)	34 (21.8)		
Age:			5.964	0.202
18-24	23 (7.4)	3 (13)		
25-34	138 (44.2)	25 (18.1)		
35-44	60 (19.2)	14 (23.3)		
45-54	56 (17.9)	18 (32.1)		
55+	35 (11.2)	9 (25.7)		
Children under 18:			2.312	0.128
Yes	86 (27.6)	24 (27.9)		
No	226 (72.4)	45 (19.9)		
Education:			3.821	0.148
GCSE/A Level or equivalent	56 (18.4)	9 (16.1)		
Bachelor degree or equivalent	131 (43.0)	36 (27.5)		
Masters/PhD or equivalent	118 (38.7)	23 (19.5)		
Health:			4.917	0.296* 3 cells have expected count less than 5
Excellent	79 (25.3)	21 (26.6)		
Very good	144 (46.2)	35 (24.3)		
Good	74 (23.7)	12 (16.2)		
Fair	14 (4.5)	1 (7.1)		
Poor	1 (0.3)	0 (0)		
Work location:			6.448	**0.011**
London	146 (46.8)	23 (15.8)		
Not London	166 (53.2)	46 (27.7)		
Salary:			1.781	0.411
Up to £30k	98 (32.6)	17 (17.3)		
More than £30k less than £50k	112 (37.2)	27 (24.1)		
£50k or more	91 (30.2)	22 (24.2)		

Table D9 Associations between demographic variables and willingness to work in the event of severe flooding

Demographic Variable	No (%) of participants	No (%) willing to go to work	X^2	p
Gender:			0.000	1.000
Male	156 (50)	129 (82.7)		
Female	156 (50)	129 (82.7)		
Age:			4.891	0.299
18-24	23 (7.4)	20 (87.0)		
25-34	138 (44.2)	109 (79.0)		
35-44	60 (19.2)	48 (80.0)		
45-54	56 (17.9)	51 (91.1)		
55+	35 (11.2)	30 (85.7)		
Children under 18:			0.88	0.767
Yes	86 (27.6)	72 (83.7)		
No	226 (72.4)	186 (82.3)		
Education:			1.123	0.570
GCSE/A Level or equivalent	56 (18.4)	44 (78.6)		
Bachelor degree or equivalent	131 (43.0)	111 (84.7)		
Masters/PhD or equivalent	118 (38.7)	99 (83.9)		
Health:			2.011* 3 cells have	0.734

Demographic Variable	No (%) of participants	No (%) willing to go to work	X^2	p
			expected count less than 5	
Excellent	79 (25.3)	68 (86.1)		
Very good	144 (46.2)	120 (83.3)		
Good	74 (23.7)	58 (78.4)		
Fair	14 (4.5)	11 (78.6)		
Poor	1 (0.3)	1 (0.4)		
Work location:			0.671	0.413
London	146 (46.8)	118 (80.8)		
Not London	166 (53.2)	140 (84.3)		
Salary:			5.342	0.069
Up to £30k	98 (32.6)	82 (83.7)		
More than £30k less than £50k	112 (37.2)	86 (76.8)		
£50k or more	91 (30.2)	81 (89.0)		

Table D10 Associations between demographic variables and willingness to work in the event of a deliberate release of pneumonic plague

Demographic Variable	No (%) of participants	No (%) willing to go to work	X^2	p
Gender:			0.18	0.895
Male	156 (50)	37 (23.7)		
Female	156 (50)	38 (24.4)		
Age:			4.809	0.307
18-24	23 (7.4)	3 (13.0)		
25-34	138 (44.2)	28 (20.3)		
35-44	60 (19.2)	17 (28.3)		
45-54	56 (17.9)	17 (30.4)		
55+	35 (11.2)	10 (28.6)		
Children under 18:			2.495	0.114
Yes	86 (27.6)	26 (30.2)		
No	226 (72.4)	49 (21.7)		
Education:			0.798	0.671
GCSE/A Level or equivalent	56 (18.4)	11 (19.6)		
Bachelor degree or equivalent	131 (43.0)	33 (25.2)		
Masters/PhD or equivalent	118 (38.7)	30 (25.4)		
Health:			5.561* 3 cells have expected count less than 5	0.234
Excellent	79 (25.3)	22 (27.8)		
Very good	144 (46.2)	39 (27.1)		
Good	74 (23.7)	13 (17.6)		
Fair	14 (4.5)	1 (7.1)		
Poor	1 (0.3)	0 (0)		
Work location:			3.550	0.060
London	146 (46.8)	28 (19.2)		
Not London	166 (53.2)	47 (28.3)		
Salary:			1.433	0.488
Up to £30k	98 (32.6)	19 (19.4)		
More than £30k less than £50k	112 (37.2)	29 (25.9)		
£50k or more	91 (30.2)	23 (25.3)		

Table D11 Associations between demographic variables and willingness to work in the event of severe snow

Demographic Variable	No (%) of participants	No (%) willing to go to work	X^2	p
Gender:			8.039	**0.005**
Male	156 (50)	146 (93.6)		
Female	156 (50)	130 (83.3)		
Age:			1.560* 2 cells have expected count less than 5	0.816
18-24	23 (7.4)	20 (87.0)		
25-34	138 (44.2)	122 (88.4)		
35-44	60 (19.2)	52 (86.7)		
45-54	56 (17.9)	52 (92.9)		
55+	35 (11.2)	30 (85.7)		
Children under 18:			0.582	0.446
Yes	86 (27.6)	78 (90.7)		
No	226 (72.4)	198 (87.6)		
Education:			5.000	0.082
GCSE/A Level or equivalent	56 (18.4)	45 (80.4)		
Bachelor degree or equivalent	131 (43.0)	119 (90.8)		
Masters/PhD or equivalent	118 (38.7)	107 (90.7)		
Health:			3.007* 3 cells have expected count less than 5	0.557
Excellent	79 (25.3)	72 (91.1)		
Very good	144 (46.2)	129 (89.6)		
Good	74 (23.7)	63 (85.1)		
Fair	14 (4.5)	11 (78.6)		
Poor	1 (0.3)	1 (100)		
Work location:			1.866	0.172
London	146 (46.8)	133 (91.1)		
Not London	166 (53.2)	143 (86.1)		
Salary:			0.560	0.756
Up to £30k	98 (32.6)	85 (86.7)		
More than £30k less than £50k	112 (37.2)	98 (87.5)		
£50k or more	91 (30.2)	82 (90.1)		

Table D12 Associations between demographic variables and willingness to work in the event of a nuclear incident

Demographic Variable	No (%) of participants	No (%)willing to go to work	X^2	p
Gender:			0.070	0.792
Male	156 (50)	39 (25.0)		
Female	156 (50)	37 (23.7)		
Age:			4.080	0.395
18-24	23 (7.4)	3 (13.0)		
25-34	138 (44.2)	31 (22.5)		
35-44	60 (19.2)	14 (23.3)		
45-54	56 (17.9)	18 (32.1)		
55+	35 (11.2)	10 (28.6)		
Children under 18:			0.811	0.368
Yes	86 (27.6)	24 (27.9)		
No	226 (72.4)	52 (23.0)		
Education:			2.534	0.282
GCSE/A Level or equivalent	56 (18.4)	11 (19.6)		
Bachelor degree or equivalent	131 (43.0)	38 (29.0)		
Masters/PhD or	118 (38.7)	26 (22.0)		

Demographic Variable	No (%) of participants	No (%)willing to go to work	X^2	p
equivalent				
Health:			4.237* 3 cells have expected count less than 5	0.375
Excellent	79 (25.3)	23 (29.1)		
Very good	144 (46.2)	38 (26.4)		
Good	74 (23.7)	13 (17.6)		
Fair	14 (4.5)	2 (14.3)		
Poor	1 (0.3)	0 (0)		
Work location:			7.797	**0.005**
London	146 (46.8)	25 (17.1)		
Not London	166 (53.2)	51 (30.7)		
Salary:			1.113	0.573
Up to £30k	98 (32.6)	21 (21.4)		
More than £30k less than £50k	112 (37.2)	31 (27.7)		
£50k or more	91 (30.2)	22 (24.2)		

Table D13 Odds ratios for demographic and categorical variables predicting willingness to work in the event of a bomb/explosive device (odds ratios adjusted for age)

Predictor Variable	No of participants (%)	No (%) willing to work	p	Unadjusted odds ratio (95% CI) for willingness to work	Adjusted odds ratio (95% CI) for willingness to work
Gender:					
Male	156 (50)	91 (58.3)	0.241		1.315 (0.832-2.077)
Female	156 (50)	77 (49.4)			Ref
Age:					
18-24	23 (7.4)	7 (30.4)	**0.006**	0.201 (0.064-0.627)	
25-34	138 (44.2)	70 (50.7)	0.062	0.472 (0.215-1.037)	
35-44	60 (19.2)	32 (53.3)	0.148	0.524 (0.218-1.257)	
45-54	56 (17.9)	35 (62.5)	0.556	0.764 (0.312-1.870)	
55+	35 (11.2)	24 (68.6)		Ref	
Work location:					
London	146 (46.8)	73 (50)	0.589		0.878 (0.549-1.406)
Not London	166 (53.2)	95 (57.2)			Ref
Salary:					
Up to £30k	98 (32.6)	45 (45.9)	0.295		0.716 (0.384-1.337)
More than £30k less than £50k	112 (37.2)	62 (55.4)	0.815		0.934 (0.536-1.658)
£50k or more	91 (30.2)	54 (59.3)			Ref
Children under 18:					
Yes	86 (27.6)	51 (59.3)	0.559		0.1.187 (0.669-2.107)
No	226 (72.4)	117 (51.8)			Ref
Education:					
GCSE/A Level or equivalent	56 (18.4)	24 (42.9)	**0.028**		0.460 (0.230-0.922)
Bachelor degree or equivalent	131 (43.0)	76 (58.0)	0.936		1.022 (0.606-1.721)
Masters/PhD or equivalent	118 (38.7)	66 (55.9)			Ref
Direct reports:					
Yes	133 (42.6)	81 (60.9)	0.141		1.427 (0.889-2.292)
No	179 (57.4)	87 (48.6)			Ref
Business continuity role:					
Yes	133 (42.6)	88 (66.2)	**0.002**		2.175 (1.345-

Predictor Variable	No of participants (%)	No (%) willing to work	p	Unadjusted odds ratio (95% CI) for willingness to work	Adjusted odds ratio (95% CI) for willingness to work
					3.515)
No	179 (57.4)	80 (44.7)			Ref
Business continuity training:					
Yes	156 (50.0)	102 (65.4)	**0.000**		2.352 (1.469-3.767)
No	156 (50.0)	66 (42.3)			Ref
General ability to work from home:					
Able to work from home	260 (84.1)	137 (52.7)	0.691		0.879 (0.465-1.661)
Not able to work from home	49 (15.9)	29 (59.2)			Ref
Job security:					
Insecure	61 (19.6)	30 (49.2)	0.377		0.771 (0.433-1.373)
Secure	251 (80.4)	138 (55.0)			Ref
Ease of getting a new job:					
Easy	132 (42.3)	73 (55.3)	0.243		1.422 (0.780-2.665)
Neither/Not sure	103 (33.0)	56 (54.4)	0.464		1.262 (0.677-2.350)
Difficult	77 (24.7)	39 (50.6)			Ref
Working climate: How often does your supervisor or manager consider your views?					
Often/Sometimes	280 (91.2)	154 (55.0)	0.050		2.296 (0.999-5.281)
Rarely/Never	27 (8.8)	10 (37.0)			Ref
Working climate: How often are you involved in conflicts at work?					
Often/Sometimes	68 (21.8)	41 (60.3)	0.586		1.170 (0.665-2.059)
Rarely/Never	244 (78.2)	127 (52.0)			Ref
Working climate: How often do you feel uneasy about going to work?					
Often/Sometimes	100 (32.1)	52 (52.0)	0.647		0.892 (0.548-1.453)
Rarely/Never	212 (67.9)	116 (54.7)			Ref
Working climate: Are you aware of any workplace bullying?					
Yes	77 (24.7)	44 (57.1)	0.986		0.995 (0.581-1.703)
No	235 (75.3)	124 (52.8)			Ref
Ability to go to work (incident specific)					
Not Able	183 (58.7)	69 (37.7)	**0.000**		0.189 (0.113-0.316)
Able	129 (41.3)	99 (76.7)			Ref

Table D14 Odds ratios for demographic and categorical variables predicting willingness to work in the event of a chemical warfare agent release

Predictor Variable	No of participants (%)	No (%) willing to work	p	Unadjusted odds ratio (95% CI) for willingness to work
Gender:				
Male	156 (50)	32 (20.5)	0.416	0.801 (0.470-1.366)
Female	156 (50)	38 (24.4)		Ref
Age:				
18-24	23 (7.4)	2 (8.7)	0.178	0.178 (0.62-1.676)
25-34	138 (44.2)	30 (21.7)	0.887	0.887 (0.386-2.275)
35-44	60 (19.2)	14 (23.3)	0.958	0.958 (0.382-2.765)
45-54	56 (17.9)	16 (28.6)	0.548	0.548 (0.507-3.594)
55+	35 (11.2)	8 (22.9)		Ref
Work location:				
London	146 (46.8)	27 (18.5)	0.119	0.649 (0.377-1.117)
Not London	166 (53.2)	43 (25.9)		Ref
Salary:				
Up to £30k	98 (32.6)	18 (18.4)	0.664	0.853 (0.415-1.750)
More than £30k less than £50k	112 (37.2)	30 (26.8)	0.329	1.386 (0.719-2.672)
£50k or more	91 (30.2)	19 (20.9)		Ref
Children under 18:				
Yes	86 (27.6)	22 (25.6)	0.412	1.275 (0.714-2.276)
No	226 (72.4)	48 (21.2)		Ref
Education:				
GCSE/A Level or equivalent	56 (18.4)	10 (17.9)	0.526	0.769 (0.342-1.730)
Bachelor degree or equivalent	131 (43.0)	33 (25.2)	0.559	1.192 (0.662-2.144)
Masters/PhD or equivalent	118 (38.7)	26 (22.0)		Ref
Direct reports:				
Yes	133 (42.6)	35 (26.3)	0.158	1.469 (0.861-2.507)
No	179 (57.4)	35 (19.6)		Ref
Business continuity role:				
Yes	133 (42.6)	36 (27.1)	0.092	1.583 (0.927-2.701)
No	179 (57.4)	34 (19.0)		Ref
Business continuity training:				
Yes	156 (50.0)	42 (26.9)	0.059	1.684 (0.981-2.892)
No	156 (50.0)	28 (17.9)		Ref
General ability to work from home:				
Able to work from home	260 (84.1)	54 (20.8)	0.132	0.594 (0.302-1.1170)
Not able to work from home	49 (15.9)	15 (30.6)		Ref
Job security:				
Insecure	61 (19.6)	9 (14.8)	0.113	0.539 (0.251-1.157)
Secure	251 (80.4)	61 (24.3)		Ref
Ease of getting a new job:				
Easy	132 (42.3)	31 (23.5)	0.416	0.767 (0.406-1.452)
Neither/Not sure	103 (33.0)	17 (16.5)	0.054	0.494 (0.241-1.013)
Difficult	77 (24.7)	22 (28.7)		Ref
Working climate: How often does your supervisor or manager consider your views?				
Often/Sometimes	280 (91.2)	64 (22.9)	0.170	2.370 (0.691-8.128)
Rarely/Never	27 (8.8)	3 (11.1)		Ref
Working climate: How often are you involved in conflicts at work?				
Often/Sometimes	68 (21.8)	17 (25.0)	0.567	1.201 (0.641-2.250)
Rarely/Never	244 (78.2)	53 (21.7)		Ref
Working climate: How often do you feel uneasy about going to work?				
Often/Sometimes	100 (32.1)	22 (22.0	0.899	0.964 (0.544-1.708)
Rarely/Never	212 (67.9)	48 (22.6)		Ref
Working climate: Are you aware of any workplace				

Predictor Variable	No of participants (%)	No (%) willing to work	p	Unadjusted odds ratio (95% CI) for willingness to work
bullying?				
Yes	77 (24.7)	24 (31.2)	**0.036**	1.861 (1.042-3.323)
No	235 (75.3)	46 (19.6)		Ref
Ability to go to work (incident specific)				
Not Able	216 (69.2)	35 (16.2)	**0.000**	0.337 (0.194-0.585)
Able	96 (30.8)	36 (36.5)		Ref

Table D15 Odds ratios for demographic and categorical variables predicting willingness to work in the event of an accidental chemical spill or leak

Predictor Variable	No of participants (%)	No (%) willing to work	p	Unadjusted odds ratio (95% CI) for willingness to work
Gender:				
Male	156 (50)	82 (52.6)	0.138	0.712 (0.454-1.115)
Female	156 (50)	95 (60.9)		Ref
Age:				
18-24	23 (7.4)	13 (56.5)	0.245	0.520 (0.173-1.567)
25-34	138 (44.2)	77 (55.8)	0.097	0.505 (0.225-1.131)
35-44	60 (19.2)	28 (46.7)	**0.021**	0.350 (0.143-0.854)
45-54	56 (17.9)	34 (60.7)	0.299	0.618 (0.249-1.533)
55+	35 (11.2)	25 (71.4)		Ref
Work location:				
London	146 (46.8)	75 (51.4)	0.074	0.663 (0.422-1.040)
Not London	166 (53.2)	102 (61.4)		Ref
Salary:				
Up to £30k	98 (32.6)	60 (61.2)	0.470	1.238 (0.693-2.212)
More than £30k less than £50k	112 (37.2)	60 (53.6)	0.725	0.905 (0.519-1.578)
£50k or more	91 (30.2)	51 (56.0)		Ref
Children under 18:				
Yes	86 (27.6)	46 (53.5)	0.476	0.834 (0.506-1.374)
No	226 (72.4)	131 (58.0)		Ref
Education:				
GCSE/A Level or equivalent	56 (18.4)	30 (53.6)	0.899	1.042 (0.551-1.971)
Bachelor degree or equivalent	131 (43.0)	82 (62.6)	0.109	1.512 (0.912-2.506)
Masters/PhD or equivalent	118 (38.7)	62 (52.5)		Ref
Direct reports:				
Yes	133 (42.6)	79 (59.4)	0.412	1.209 (0.768-1.905)
No	179 (57.4)	98 (54.7)		Ref
Business continuity role:				
Yes	133 (42.6)	86 (64.7)	**0.015**	1.769 (1.116-2.805)
No	179 (57.4)	91 (50.8)		Ref
Business continuity training:				
Yes	156 (50.0)	101 (64.7)	**0.004**	1.933 (1.227-3.045)
No	156 (50.0)	76 (48.7)		Ref
General ability to work from home:				
Able to work from home	260 (84.1)	147 (56.5)	0.938	0.976 (0.527-1.808)
Not able to work from home	49 (15.9)	28 (57.1)		Ref
Job security:				
Insecure	61 (19.6)	29 (47.5)	0.108	0.631 (0.360-1.106)
Secure	251 (80.4)	148 (59.0)		Ref
Ease of getting a new job:				
Easy	132 (42.3)	84 (63.6)	0.851	1.057 (0.591-1.891)
Neither/Not sure	103 (33.0)	45 (43.7)	**0.014**	0.469 (0.256-0.857)
Difficult	77 (24.7)	48 (62.3)		
Working climate: How often does your supervisor or manager consider your views?				
Often/Sometimes	280 (91.2)	161 (57.5)	0.099	1.968 (0.881-4.395)
Rarely/Never	27 (8.8)	11 (40.7)		Ref

Predictor Variable	No of participants (%)	No (%) willing to work	p	Unadjusted odds ratio (95% CI) for willingness to work
Working climate: How often are you involved in conflicts at work?				
Often/Sometimes	68 (21.8)	38 (55.9)	0.873	0.957 (0.557-1.645)
Rarely/Never	244 (78.2)	139 (57.0)		Ref
Working climate: How often do you feel uneasy about going to work?				
Often/Sometimes	100 (32.1)	52 (52.0)	0.247	0.754 (0.467-1.216)
Rarely/Never	212 (67.9)	125 (59.0)		Ref
Working climate: Are you aware of any workplace bullying?				
Yes	77 (24.7)	48 (62.3)	0.253	1.360 (0.802-2.305)
No	235 (75.3)	129 (54.9)		Ref
Ability to go to work (incident specific)				
Not Able	156 (50.0)	60 (38.5)	**0.000**	0.208 (0.128-0.338)
Able	156 (50.0)	117 (75.0)		Ref

Table D16 Odds ratios for demographic and categorical variables predicting willingness to work in the event of pandemic flu (new strain) (odds ratios adjusted for location)

Predictor Variable	No of participants (%)	No (%) willing to work	p	Unadjusted odds ratio (95% CI) for willingness to work	Adjusted odds ratio (95% CI) for willingness to work
Gender:					
Male	156 (50)	78 (50)	0.069		0.640 (0.407-1.007)
Female	156 (50)	95 (60.9)			Ref
Age:					
18-24	23 (7.4)	11 (47.8)	0.076		0.359 (0.116-1.112)
25-34	138 (44.2)	71 (51.4)	**0.037**		0.408 (0.176-0.948)
35-44	60 (19.2)	31 (51.7)	0.057		0.408 (0.162-1.028)
45-54	56 (17.9)	34 (60.7)	0.195		0.541 (0.213-1.371)
55+	35 (11.2)	26 (74.3)			Ref
Work location:					
London	146 (46.8)	72 (49.3)	**0.041**	0.626 (0.399-0.982)	
Not London	166 (53.2)	101 (60.8)		Ref	
Salary:					
Up to £30k	98 (32.6)	54 (55.1)	0.711		0.894 (0.496-1.613)
More than £30k less than £50k	112 (37.2)	64 (57.1)	0.889		1.041 (0.593-1.828)
£50k or more	91 (30.2)	50 (54.9)			Ref
Children under 18:					
Yes	86 (27.6)	45 (52.3)	0.414		0.618 (0.394-0.971)
No	226 (72.4)	128 (56.6)			Ref
Education:					
GCSE/A Level or equivalent	56 (18.4)	30 (53.6)	0.680		1.145 (0.601-2.2184)
Bachelor degree or equivalent	131 (43.0)	82 (62.6)	**0.032**		1.747 (1.049-2.907)
Masters/PhD or equivalent	118 (38.7)	57 (48.3)			Ref
Direct reports:					
Yes	133 (42.6)	80 (60.2)	0.128		1.428 (0.903-2.258)

Predictor Variable	No of participants (%)	No (%) willing to work	p	Unadjusted odds ratio (95% CI) for willingness to work	Adjusted odds ratio (95% CI) for willingness to work
No	179 (57.4)	93 (52.0)			Ref
Business continuity role:					
Yes	133 (42.6)	87 (65.4)	**0.005**		1.961 (1.231-3.126)
No	179 (57.4)	86 (48.0)			Ref
Business continuity training:					
Yes	156 (50.0)	104 (66.7)	**0.000**		2.557 (1.609-4.062)
No	156 (50.0)	69 (44.2)			Ref
General ability to work from home:					
Able to work from home	260 (84.1)	145 (55.8)	0.629		1.168 (0.622-2.190)
Not able to work from home	49 (15.9)	27 (55.1)			Ref
Job security:					
Insecure	61 (19.6)	23 (37.7)	**0.002**		0.396 (0.221-0.708)
Secure	251 (80.4)	150 (59.8)			Ref
Ease of getting a new job:					
Easy	132 (42.3)	75 (56.8)	0.839		0.942 (0.529-1.678)
Neither/Not sure	103 (33.0)	52 (50.5)	0.236		0.695 (0.381-1.268)
Difficult	77 (24.7)	46 (59.7)			Ref
Working climate: How often does your supervisor or manager consider your views?					
Often/Sometimes	280 (91.2)	160 (57.1)	**0.011**		2.982 (1.278-6.957)
Rarely/Never	27 (8.8)	9 (33.3)			
Working climate: How often are you involved in conflicts at work?					
Often/Sometimes	68 (21.8)	41 (60.3)	0.392		1.272 (0.733-2.207)
Rarely/Never	244 (78.2)	132 (54.1)			Ref
Working climate: How often do you feel uneasy about going to work?					
Often/Sometimes	100 (32.1)	48 (48.0)	0.087		0.657 (0.406-1.064)
Rarely/Never	212 (67.9)	125 (59.0)			Ref
Working climate: Are you aware of any workplace bullying?					
Yes	77 (24.7)	47 (61.0)	0.350		0.640 (0.407-1.006)
No	235 (75.3)	126 (53.6)			Ref
Ability to go to work (incident specific)					
Not Able	116 (37.2)	43 (37.1)	**0.000**		0.308 (0.190-0.499)
Able	196 (62.8)	130 (66.3)			Ref

Table D17 Odds ratios for demographic and categorical variables predicting willingness to work in the event of a deliberate release of the smallpox virus

Predictor Variable	No of participants (%)	No (%) willing to work	p	Unadjusted odds ratio (95% CI) for willingness to work
Gender:				
Male	156 (50)	45 (28.8)	0.901	0.969 (0.595-1.580)
Female	156 (50)	46 (29.5)		Ref
Age:				
18-24	23 (7.4)	6 (26.1)	0.510	0.676 (0.211-2.165)
25-34	138 (44.2)	35 (25.4)	0.291	0.651 (0.294-1.444)
35-44	60 (19.2)	17 (28.3)	0.544	0.758 (0.309-1.856)
45-54	56 (17.9)	21 (37.5)	0.756	1.150 (0.476-2.781)
55+	35 (11.2)	12 (34.3)		Ref
Work location:				
London	146 (46.8)	37 (25.3)	0.164	0.704 (0.429-1.154)
Not London	166 (53.2)	54 (32.5)		Ref
Salary:				
Up to £30k	98 (32.6)	27 (27.6)	0.747	0.901 (0.479-1.695)
More than £30k less than £50k	112 (37.2)	34 (30.4)	0.915	1.033 (0.565-1.890)
£50k or more	91 (30.2)	27 (29.7)		Ref
Children under 18:				
Yes	86 (27.6)	26 (30.2)	0.798	1.073 (0.624-1.847)
No	226 (72.4)	65 (28.8)		Ref
Education:				
GCSE/A Level or equivalent	56 (18.4)	17 (30.4)	0.420	1.338 (0.660-2.718)
Bachelor degree or equivalent	131 (43.0)	43 (32.8)	0.153	1.500 (0.860-2.614)
Masters/PhD or equivalent	118 (38.7)	29 (24.6)		Ref
Direct reports:				
Yes	133 (42.6)	43 (32.3)	0.290	1.304 (0.798-2.131)
No	179 (57.4)	48 (26.8)		Ref
Business continuity role:				
Yes	133 (42.6)	46 (34.6)	0.070	1.574 (0.963-2.574)
No	179 (57.4)	45 (25.1)		Ref
Business continuity training:				
Yes	156 (50.0)	54 (34.6)	**0.035**	1.703 (1.038-2.793)
No	156 (50.0)	37 (23.7)		Ref
General ability to work from home:				
Able to work from home	260 (84.1)	74 (28.5)	0.554	0.821 (0.426-1.580)
Not able to work from home	49 (15.9)	16 (32.7)		Ref
Job security:				
Insecure	61 (19.6)	12 (19.7)	0.072	0.533 (0.269-1.058)
Secure	251 (80.4)	79 (31.5)		Ref
Ease of getting a new job:				
Easy	132 (42.3)	41 (31.1)	0.987	0.995 (0.542-1.826)
Neither/Not sure	103 (33.0)	26 (25.2)	0.380	0.746 (0.387-1.437)
Difficult	77 (24.7)	24 (31.2)		Ref
Working climate: How often does your supervisor or manager consider your views?				
Often/Sometimes	280 (91.2)	84 (30.0)	0.106	2.464 (0.827-7.345)
Rarely/Never	27 (8.8)	4 (14.8)		Ref
Working climate: How often are you involved in conflicts at work?				
Often/Sometimes	68 (21.8)	24 (35.3)	0.210	1.441 (0.814-2.551)
Rarely/Never	244 (78.2)	67 (27.5)		Ref
Working climate: How often do you feel uneasy about going to work?				
Often/Sometimes	100 (32.1)	26 (26.0)	0.399	0.795 (0.466-1.355)
Rarely/Never	212 (67.9)	65 (30.7)		Ref
Working climate: Are you aware of any workplace				

Predictor Variable	No of participants (%)	No (%) willing to work	p	Unadjusted odds ratio (95% CI) for willingness to work
bullying?				
Yes	77 (24.7)	26 (33.8)	0.307	1.333 (0.768-2.316)
No	235 (75.3)	65 (27.7)		Ref
Ability to go to work (incident specific)				
Not Able	184 (59.0)	43 (23.4)	**0.007**	0.508 (0.310-0.833)
Able	128 (41.0)	48 (37.5)		Ref

Table D18 Odds ratios for demographic and categorical variables predicting willingness to work in the event of a dirty bomb (odds ratios adjusted for location)

Predictor Variable	No of participants (%)	No (%) willing to work	p	Unadjusted odds ratio (95% CI) for willingness to work	Adjusted odds ratio (95% CI) for willingness to work
Gender:					
Male	156 (50)	35 (22.4)	0.762		1.087 (0.633-1.869)
Female	156 (50)	34 (21.8)			Ref
Age:					
18-24	23 (7.4)	3 (13)	0.401		0.537 (0.126-2.291)
25-34	138 (44.2)	25 (18.1)	0.568		0.771 (0.315-1.884)
35-44	60 (19.2)	14 (23.3)	0.923		1.050 (0.392-2.811)
45-54	56 (17.9)	18 (32.1)	0.483		1.405 (0.544-3.628)
55+	35 (11.2)	9 (25.7)			Ref
Work location:					
London	146 (46.8)	23 (15.8)	**0.012**	0.488 (0.279-0.854)	
Not London	166 (53.2)	46 (27.7)		Ref	
Salary:					
Up to £30k	98 (32.6)	17 (17.3)	0.086		0.525 (0.251-1.095)
More than £30k less than £50k	112 (37.2)	27 (24.1)	0.766		0.905 (0.467-1.752)
£50k or more	91 (30.2)	22 (24.2)			Ref
Children under 18:					
Yes	86 (27.6)	24 (27.9)	0.171		0.667 (0.374-1.191)
No	226 (72.4)	45 (19.9)			Ref
Education:					
GCSE/A Level or equivalent	56 (18.4)	9 (16.1)	0.417		0.701 (0.297-1.654)
Bachelor degree or equivalent	131 (43.0)	36 (27.5)	0.185		1.503 (0.822-2.747)
Masters/PhD or equivalent	118 (38.7)	23 (19.5)			Ref
Direct reports:					
Yes	133 (42.6)	37 (27.8)	**0.028**		1.843 (1.067-3.183)
No	179 (57.4)	32 (17.9)			Ref
Business continuity role:					
Yes	133 (42.6)	39 (29.3)	**0.019**		1.931 (1.116-3.339)
No	179 (57.4)	30 (16.8)			Ref
Business continuity training:					
Yes	156 (50.0)	43 (27.6)	**0.020**		1.929 (1.108-3.358)
No	156 (50.0)	26 (16.7)			Ref
General ability to work from home:					

Predictor Variable	No of participants (%)	No (%) willing to work	p	Unadjusted odds ratio (95% CI) for willingness to work	Adjusted odds ratio (95% CI) for willingness to work
Able to work from home	260 (84.1)	54 (20.8)	0.453		0.764 (0.378-1.544)
Not able to work from home	49 (15.9)	14 (28.6)			Ref
Job security:					
Insecure	61 (19.6)	10 (16.4)	0.206		0.618 (0.294-1.303)
Secure	251 (80.4)	59 (23.5)			Ref
Ease of getting a new job:					
Easy	132 (42.3)	32 (24.2)	0.835		1.073 (0.552-2.086)
Neither/Not sure	103 (33.0)	18 (17.5)	0.261		0.657 (0.315-1.367)
Difficult	77 (24.7)	19 (24.7)			Ref
Working climate: How often does your supervisor or manager consider your views?					
Often/Sometimes	280 (91.2)	65 (23.2)	0.050		4.378 (1.001-19.158)
Rarely/Never	27 (8.8)	2 (7.4)			Ref
Working climate: How often are you involved in conflicts at work?					
Often/Sometimes	68 (21.8)	18 (26.5)	0.362		1.339 (0.715-2.508)
Rarely/Never	244 (78.2)	51 (20.9)			Ref
Working climate: How often do you feel uneasy about going to work?					
Often/Sometimes	100 (32.1)	17 (17.0)	0.172		0.652 (0.353-1.205)
Rarely/Never	212 (67.9)	52 (24.5)			Ref
Working climate: Are you aware of any workplace bullying?					
Yes	77 (24.7)	22 (28.6)	0.191		1.489 (0.820-2.704)
No	235 (75.3)	47 (20.0)			Ref
Ability to go to work (incident specific)					
Not Able	228 (73.1)	40 (17.5)	**0.004**		0.436 (0.246--0773)
Able	84 (26.9)	29 (34.5)			Ref

Table D19 Odds ratios for demographic and categorical variables predicting willingness to work in the event of severe flooding

Predictor Variable	No of participants (%)	No (%) willing to work	p	Unadjusted odds ratio (95% CI) for willingness to work
Gender:				
Male	156 (50)	129 (82.7)	1.000	1.000 (0.445-1.798)
Female	156 (50)	129 (82.7)		Ref
Age:				
18-24	23 (7.4)	20 (87.0)	0.893	1.111 (0.238-5.178
25-34	138 (44.2)	109 (79.0)	0.374	0.626 (0.223-1.757)
35-44	60 (19.2)	48 (80.0)	0.485	0.667 (0.214-2.082)
45-54	56 (17.9)	51 (91.1)	0.430	1.700 (0.455-6.358)
55+	35 (11.2)	30 (85.7)		Ref
Work location:				
London	146 (46.8)	118 (80.8)	0.413	0.783 (0.435-1.408)
Not London	166 (53.2)	140 (84.3)		Ref

Predictor Variable	No of participants (%)	No (%) willing to work	p	Unadjusted odds ratio (95% CI) for willingness to work
Salary:				
Up to £30k	98 (32.6)	82 (83.7)	0.290	0.633 (0.271-1.477)
More than £30k less than £50k	112 (37.2)	86 (76.8)	**0.026**	0.408 (0.185-0.900)
£50k or more	91 (30.2)	81 (89.0)		Ref
Children under 18:				
Yes	86 (27.6)	72 (83.7)	0.767	1.106 (0.568-2.154)
No	226 (72.4)	186 (82.3)		Ref
Education:				
GCSE/A Level or equivalent	56 (18.4)	44 (78.6)	0.392	0.704 (0.315-1.574)
Bachelor degree or equivalent	131 (43.0)	111 (84.7)	0.856	1.065 (0.538-2.111)
Masters/PhD or equivalent	118 (38.7)	99 (83.9)		Ref
Direct reports:				
Yes	133 (42.6)	113 (85.0)	0.362	1.325 (0.724-2.425)
No	179 (57.4)	145 (81.0)		Ref
Business continuity role:				
Yes	133 (42.6)	114 (85.7)	0.226	1.458 (0.792-2.684)
No	179 (57.4)	144 (80.4)		Ref
Business continuity training:				
Yes	156 (50.0)	134 (85.9)	0.136	1.572 (0.867-2.850)
No	156 (50.0)	124 (79.5)		Ref
General ability to work from home:				
Able to work from home	260 (84.1)	211 (81.2)	0.151	0.489 (0.184-1.298)
Not able to work from home	49 (15.9)	44 (89.8)		Ref
Job security:				
Insecure	61 (19.6)	46 (75.4)	0.097	0.564 (0.287-1.109)
Secure	251 (80.4)	212 (84.5)		Ref
Ease of getting a new job:				
Easy	132 (42.3)	109 (82.6)	0.549	1.243 (0.611-2.531)
Neither/Not sure	103 (33.0)	88 (85.4)	0.277	1.539 (0.708-3.345)
Difficult	77 (24.7)	61 (79.2)		Ref
Working climate: How often are you involved in conflicts at work?				
Often/Sometimes	68 (21.8)	57 (83.8)	0.780	1.109 (0.537-2.288)
Rarely/Never	244 (78.2)	201 (82.4)		Ref
Working climate: How often do you feel uneasy about going to work?				
Often/Sometimes	100 (32.1)	77 (77.0)	0.070	0.573 (0.314-1.047)
Rarely/Never	212 (67.9)	181 (85.4)		Ref
Working climate: Are you aware of any workplace bullying?				
Yes	77 (24.7)	60 (77.9)	0.204	0.660 (0.347-1.254)
No	235 (75.3)	198 (84.3)		Ref
Ability to go to work (incident specific)				
Not Able	196 (62.8)	146 (74.5)	**0.000**	0.104 (0.037-0.297)
Able	116 (37.2)	112 (96.6)		Ref

Table D20 Odds ratios for demographic and categorical variables predicting willingness to work in the event of a deliberate release of pneumonic plague

Predictor Variable	No of participants (%)	No (%) willing to work	p	Unadjusted odds ratio (95% CI) for willingness to work
Gender:				
Male	156 (50)	37 (23.7)	0.895	0.966 (0.574-1.623)
Female	156 (50)	38 (24.4)		Ref
Age:				
18-24	23 (7.4)	3 (13.0)	0.175	0.375 (0.091-1.548)
25-34	138 (44.2)	28 (20.3)	0.293	0.636 (0.274-1.478)

Predictor Variable	No of participants (%)	No (%) willing to work	p	Unadjusted odds ratio (95% CI) for willingness to work
35-44	60 (19.2)	17 (28.3)	0.980	0.988 (0.392-2.489)
45-54	56 (17.9)	17 (30.4)	0.856	1.090 (0.431-2.758)
55+	35 (11.2)	10 (28.6)		Ref
Work location:				
London	146 (46.8)	28 (19.2)	0.061	0.601 (0.353-1.023)
Not London	166 (53.2)	47 (28.3)		Ref
Salary:				
Up to £30k	98 (32.6)	19 (19.4)	0.332	0.711 (0.357-1.416)
More than £30k less than £50k	112 (37.2)	29 (25.9)	0.920	1.033 (0.548-1.948)
£50k or more	91 (30.2)	23 (25.3)		Ref
Children under 18:			0.116	1.565 (0.895-2.736)
Yes	86 (27.6)	26 (30.2)		Ref
No	226 (72.4)	49 (21.7)		
Education:				
GCSE/A Level or equivalent	56 (18.4)	11 (19.6)	0.402	0.717 (0.329-1.562)
Bachelor degree or equivalent	131 (43.0)	33 (25.2)	0.966	0.988 (0.557-1.750)
Masters/PhD or equivalent	118 (38.7)	30 (25.4)		Ref
Direct reports:				
Yes	133 (42.6)	38 (28.6)	0.107	1.535 (0.911-2.587)
No	179 (57.4)	37 (20.7)		Ref
Business continuity role:				
Yes	133 (42.6)	41 (30.8)	**0.016**	1.901 (1.125-3.211)
No	179 (57.4)	34 (19.0)		Ref
Business continuity training:				
Yes	156 (50.0)	47 (30.1)	**0.013**	1.971 (1.157-3.359)
No	156 (50.0)	28 (17.9)		Ref
General ability to work from home:				
Able to work from home	260 (84.1)	59 (22.7)	0.236	0.665 (0.339-1.305)
Not able to work from home	49 (15.9)	15 (30.6)		Ref
Job security:				
Insecure	61 (19.6)	10 (16.4)	0.123	0.561 (0.269-1.169)
Secure	251 (80.4)	65 (25.9)		Ref
Ease of getting a new job:				
Easy	132 (42.3)	34 (25.8)	0.658	0.867 (0.462-1.628)
Neither/Not sure	103 (33.0)	19 (18.4)	0.111	0.565 (0.280-1.141)
Difficult	77 (24.7)	22 (28.6)		Ref
Working climate: How often does your supervisor or manager consider your views?				
Often/Sometimes	280 (91.2)	68 (24.3)	0.274	1.844 (0.616-5.521)
Rarely/Never	27 (8.8)	4 (14.8)		Ref
Working climate: How often are you involved in conflicts at work?				
Often/Sometimes	68 (21.8)	22 (32.4)	0.072	1.724 (0.953-3.116)
Rarely/Never	244 (78.2)	53 (21.7)		Ref
Working climate: How often do you feel uneasy about going to work?				
Often/Sometimes	100 (32.1)	23 (23.0)	0.768	0.919 (0.524-1.611)
Rarely/Never	212 (67.9)	52 (24.5)		Ref
Working climate: Are you aware of any workplace bullying?				
Yes	77 (24.7)	23 (29.9)	0.169	1.499 (0.842-2.669)
No	235 (75.3)	52 (22.1)		
Ability to go to work (incident specific)				
Not Able	188 (60.3)	34 (18.1)	**0.003**	0.447 (0.264-0.757)
Able	124 (39.7)	41 (33.1)		Ref

Table D21 Odds ratios for demographic and categorical variables predicting willingness to work in the event of severe snow (odds ratios adjusted for gender)

Predictor Variable	No of participants (%)	No (%) willing to work	p	Unadjusted odds ratio (95% CI) for willingness to work	Adjusted odds ratio (95% CI) for willingness to work
Gender:					
Male	156 (50)	146 (93.6)	**0.006**	2.920 (1.357-6.285)	
Female	156 (50)	130 (83.3)		Ref	
Age:					
18-24	23 (7.4)	20 (87.0)	0.608		1.509 (0.313-7.264)
25-34	138 (44.2)	122 (88.4)	0.483		1.485 (0.492-4.484)
35-44	60 (19.2)	52 (86.7)	0.824		1.150 (0.337-3.920)
45-54	56 (17.9)	52 (92.9)	0.239		2.332 (0.569-9.551)
55+	35 (11.2)	30 (85.7)			Ref
Work location:					
London	146 (46.8)	133 (91.1)	0.231		1.561 (0.753-3.236)
Not London	166 (53.2)	143 (86.1)			Ref
Salary:					
Up to £30k	98 (32.6)	85 (86.7)	0.944		0.967 (0.380-2.462)
More than £30k less than £50k	112 (37.2)	98 (87.5)	0.706		0.841 (0.342-2.071)
£50k or more	91 (30.2)	82 (90.1)			Ref
Children under 18:					
Yes	86 (27.6)	78 (90.7)	0.770		1.135 (0.486-2.653)
No	226 (72.4)	198 (87.6)			Ref
Education:					
GCSE/A Level or equivalent	56 (18.4)	45 (80.4)	0.129		0.487 (0.193-1.233)
Bachelor degree or equivalent	131 (43.0)	119 (90.8)	0.619		1.250 (0.519-3.011)
Masters/PhD or equivalent	118 (38.7)	107 (90.7)			Ref
Direct reports:					
Yes	133 (42.6)	119 (89.5)	0.804		1.096 (0.532-2.257)
No	179 (57.4)	157 (87.7)			Ref
Business continuity role:					
Yes	133 (42.6)	119 (89.5)	0.719		1.141 (0.555-2.347)
No	179 (57.4)	157 (87.7)			Ref
Business continuity training:					
Yes	156 (50.0)	140 (89.7)	0.593		1.213 (0.597-2.463)
No	156 (50.0)	136 (87.2)			Ref
General ability to work from home:					
Able to work from home	260 (84.1)	230 (88.5)	0.951		1.030 (0.399-2.658)
Not able to work from home	49 (15.9)	43 (87.8)			Ref
Job security:					
Insecure	61 (19.6)	54 (88.5)	0.690		1.199 (0.491-2.931)
Secure	251 (80.4)	222 (88.4)			Ref
Ease of getting a new job:					
Easy	132 (42.3)	117 (88.6)	0.210		1.671 (0.749-3.727)
Neither/Not sure	103 (33.0)	96 (93.2)	**0.031**		2.922 (1.105-

Predictor Variable	No of participants (%)	No (%) willing to work	p	Unadjusted odds ratio (95% CI) for willingness to work	Adjusted odds ratio (95% CI) for willingness to work
					7.27)
Difficult	77 (24.7)	63 (81.8)			Ref
Working climate: How often does your supervisor or manager consider your views?					
Often/Sometimes	280 (91.2)	250 (89.3)	0.085		2.415 (0.885-6.590)
Rarely/Never	27 (8.8)	21 (77.8)			Ref
Working climate: How often are you involved in conflicts at work?					
Often/Sometimes	68 (21.8)	60 (88.2)	0.766		0.879 (0.375-2.059)
Rarely/Never	244 (78.2)	216 (88.5)			Ref
Working climate: How often do you feel uneasy about going to work?					
Often/Sometimes	100 (32.1)	85 (85.0)	0.280		0.672 (0.327-1.382)
Rarely/Never	212 (67.9)	191 (90.1)			Ref
Working climate: Are you aware of any workplace bullying?					
Yes	77 (24.7)	62 (80.5)	0.058		0.489 (0.234-1.024)
No	235 (75.3)	214 (91.1)			Ref
Ability to go to work (incident specific)					
Not Able	171 (54.8)	140 (81.9)	**0.000**		0.161 (0.060-0.428)
Able	141 (45.2)	136 (96.5)			Ref

Table D22 Odds ratios for demographic and categorical variables predicting willingness to work in the event of a nuclear incident (odds ratios adjusted for location)

Predictor Variable	No of participants (%)	No (%) willing to work	p	Unadjusted odds ratio (95% CI) for willingness to work	Adjusted odds ratio (95% CI) for willingness to work
Gender:					
Male	156 (50)	39 (25.0)	0.653		1.128 (0.667-1.907)
Female	156 (50)	37 (23.7)			Ref
Age:					
18-24	23 (7.4)	3 (13.0)	0.312		0.476 (0.113-2.006)
25-34	138 (44.2)	31 (22.5)	0.804		0.897 (0.380-2.115)
35-44	60 (19.2)	14 (23.3)	0.878		0.927 (0.353-2.437)
45-54	56 (17.9)	18 (32.1)	0.678		1.218 (0.480-3.089
55+	35 (11.2)	10 (28.6)			Ref
Work location:					
London	146 (46.8)	25 (17.1)	**0.006**	0.466 (0.271-0.801)	
Not London	166 (53.2)	51 (30.7)		Ref	
Salary:					
Up to £30k	98 (32.6)	21 (21.4)	0.285		0.681 (0.336-1.379)
More than £30k less than £50k	112 (37.2)	31 (27.7)	0.786		1.094 (0.572-2.092)

Predictor Variable	No of participants (%)	No (%) willing to work	p	Unadjusted odds ratio (95% CI) for willingness to work	Adjusted odds ratio (95% CI) for willingness to work
£50k or more	91 (30.2)	22 (24.2)			Ref
Children under 18:					
Yes	86 (27.6)	24 (27.9)	0.462		1.239 (0.700-2.195)
No	226 (72.4)	52 (23.0)			Ref
Education:					
GCSE/A Level or equivalent	56 (18.4)	11 (19.6)	0.506		0.761 (0.341-1.701)
Bachelor degree or equivalent	131 (43.0)	38 (29.0)	0.277		1.384 (0.771-2.483)
Masters/PhD or equivalent	118 (38.7)	26 (22.0)			Ref
Direct reports:					
Yes	133 (42.6)	40 (30.1)	**0.032**		1.785 (1.051-3.030)
No	179 (57.4)	36 (20.1)			Ref
Business continuity role:					
Yes	133 (42.6)	44 (33.1)	**0.006**		2.127 (1.248-3.623)
No	179 (57.4)	32 (17.9)			Ref
Business continuity training:					
Yes	156 (50.0)	49 (31.4)	**0.004**		2.234 (1.298-3.843)
No	156 (50.0)	27 (17.3)			Ref
General ability to work from home:					
Able to work from home	260 (84.1)	62 (23.8)	**0.923**		1.036 (0.508-2.112)
Not able to work from home	49 (15.9)	13 (26.5)			Ref
Job security:					
Insecure	61 (19.6)	13 (21.3)	0.488		0.785 (0.396-1.556)
Secure	251 (80.4)	63 (25.1)			Ref
Ease of getting a new job:					
Easy	132 (42.3)	33 (25.0)	0.946		0.978 (0.511-1.872)
Neither/Not sure	103 (33.0)	22 (21.4)	0.391		0.737 (0.367-1.480)
Difficult	77 (24.7)	21 (27.3)			Ref
Working climate: How often does your supervisor or manager consider your views?					
Often/Sometimes	280 (91.2)	71 (25.4)	0.068		3.175 (0.917-10.988)
Rarely/Never	27 (8.8)	3 (11.1)			Ref
Working climate: How often are you involved in conflicts at work?					
Often/Sometimes	68 (21.8)	20 (29.4)	0.305		1.375 (0.748-2.529)
Rarely/Never	244 (78.2)	56 (23.0)			Ref
Working climate: How often do you feel uneasy about going to work?					
Often/Sometimes	100 (32.1)	23 (23.0)	0.821		0.936 (0.531-1.652)
Rarely/Never	212 (67.9)	53 (25.0)			Ref
Working climate: Are you aware of any workplace bullying?					
Yes	77 (24.7)	24 (31.2)	0.188		1.477 (0.826-2.641)
No	235 (75.3)	52 (22.1)			Ref

Predictor Variable	No of participants (%)	No (%) willing to work	p	Unadjusted odds ratio (95% CI) for willingness to work	Adjusted odds ratio (95% CI) for willingness to work
Ability to go to work (incident specific)					
Not Able	230 (73.7)	40 (17.4)	**0.000**		0.301 (0.171—0.529)
Able	82 (26.3)	36 (43.9)			Ref

Table D23 Reliability of predictor scales

Predictor scales	Cronbach's alpha
Organisational Identification	0.848 (good)
Job satisfaction	0.847 (good)
Resilience	0.709 (good)
Sensation seeking	0.871 (good)

Table D24 Odds ratios for continuous variables predicting willingness to work in the event of a bomb/explosive device (odds ratios adjusted for age)

Predictor Variable	Scale range or unit of measurement	Mean (SD), No of participants	p	Adjusted odds ratio (95% CI) for willingness to work
Organisational Identification	1-5 (higher number = identifies more with organisation)	3.38 (0.83), 312	**0.001**	1.627 (1.216-2.177)
Job satisfaction	1-7 (higher number = more satisfied with job)	5.29 (1.37), 312	**0.018**	1.229 (1.036-1.459)
Belief that going to work during a serious incident will make a big difference to the organisation	1-9 (higher number = more belief role is important)	6.08 (2.35), 312	**0.021**	1.123 (1.018-1.240)
Belief that organisation continuing to function during a serious incident will make a big difference to keeping country running	1-9 (higher number = more belief recovery of organisation is important)	5.65 (2.72), 312	**0.000**	1.173 (1.075-1.280)
Belief that health and safety of staff is priority with management	1-9 (lower number = more belief health and safety is important to employer)	2.74 (1.80) 312	**0.001**	0.803 (0.702-0.919)
Belief that organisation would put continuation of business above personal safety	1-9 (lower number = more belief that organisation would put continuation of business above personal safety)	6.46 (2.45), 312	**0.032**	1.108 (1.009-1.218)
Sensation seeking	1-5 (lower number = more sensation seeking personality)	3.57 (1.01), 312	0.240	0.871 (0.691-1.097)
Resilience	1-5 (higher number = more resilient)	4.12 (0.66), 312	0.087	1.355 (0.957-1.920)
Likelihood of incident occurring in an area close to their place of work	1-9 (higher number = more likely to occur)	4.37 (2.33), 312	0.262	1.058 (0.959-1.168)
Likelihood of incident causing severe public health consequences if it did occur	1-9 (higher number = more likely to cause severe public health consequences if it did occur	7.65 (1.91), 312	**0.015**	0.849 (0.745-0.968)
Likelihood of incident putting own health at risk if it did occur	1-9 (higher number = more likely to put own health at risk if it did occur	7.01 (2.28), 312	**0.013**	0.873 (0.785-0.972)
Length of time spent working for organisation	Years	7.50 (8.45), 312	0.878	0.997 (0.964-1.032)

Table D25 Odds ratios for continuous variables predicting willingness to work in the event of a chemical warfare agent release

Predictor Variable	Scale range or unit of measurement	Mean (SD), No of participants	p	Unadjusted odds ratio (95% CI) for willingness to work
Organisational Identification	1-5 (higher number = identifies more with organisation)	3.38 (0.83), 312	**0.001**	1.817 (1.279-2.582)
Job satisfaction	1-7 (higher number = more satisfied with job)	5.29 (1.37), 312	0.214	1.141 (0.927-1.405)
Belief that going to work during a serious incident will make a big difference to the organisation	1-9 (higher number = more belief role is important)	6.08 (2.35), 312	**0.000**	1.359 (1.178-1.569)
Belief that organisation continuing to function during a serious incident will make a big difference to keeping country running	1-9 (higher number = more belief recovery of organisation is important)	5.65 (2.72), 312	**0.000**	1.291 (1.150-1.451)
Belief that health and safety of staff is priority with management	1-9 (lower number = more belief health and safety is important to employer)	2.74 (1.80) 312	0.115	0.874 (0.739-1.033)
Belief that organisation would put continuation of business above personal safety	1-9 (lower number = more belief that organisation would put continuation of business above personal safety)	6.46 (2.45), 312	0.490	1.040 (0.931-1.162)
Sensation seeking	1-5 (lower number = more sensation seeking personality)	3.57 (1.01), 312	0.929	0.988 (0.758-1.287)
Resilience	1-5 (higher number = more resilient)	4.12 (0.66), 312	0.378	1.203 (0.798-1.815)
Likelihood of incident occurring in an area close to their place of work	1-9 (higher number = more likely to occur)	2.64 (1.99), 312	0.238	1.080 (0.950-1.228)
Likelihood of incident causing severe public health consequences if it did occur	1-9 (higher number = more likely to cause severe public health consequences if it did occur	8.15 (1.53), 312	**0.002**	0.779 (0.666-0.910)
Likelihood of incident putting own health at risk if it did occur	1-9 (higher number = more likely to put own health at risk if it did occur	7.54 (2.13), 312	0.211	0.928 (0.825-1.043)
Length of time spent working for organisation	Years	7.50 (8.45), 312	**0.043**	1.030 (1.001-1.060)

Table D26 Odds ratios for continuous variables predicting willingness to work in the event of an accidental chemical spill or leak

Predictor Variable	Scale range or unit of measurement	Mean (SD), No of participants	p	Unadjusted odds ratio (95% CI) for willingness to work
Organisational identification	1-5 (higher number = identifies more with organisation)	3.38 (0.83), 312	**0.014**	1.420 (1.075-1.877)
Job satisfaction	1-7 (higher number = more satisfied with job)	5.29 (1.37), 312	**0.038**	1.192 (1.010-1.406)
Belief that going to work during a serious incident will make a big difference to the organisation	1-9 (higher number = more belief role is important)	6.08 (2.35), 312	**0.004**	1.153 (1.046-1.271)

Predictor Variable	Scale range or unit of measurement	Mean (SD), No of participants	p	Unadjusted odds ratio (95% CI) for willingness to work
Belief that organisation continuing to function during a serious incident will make a big difference to keeping country running	1-9 (higher number = more belief recovery of organisation is important)	5.65 (2.72), 312	**0.000**	1.164 (1.070-1.267)
Belief that health and safety of staff is priority with management	1-9 (lower number = more belief health and safety is important to employer)	2.74 (1.80) 312	**0.018**	0.858 (0.755-0.975)
Belief that organisation would put continuation of business above personal safety	1-9 (lower number = more belief that organisation would put continuation of business above personal safety)	6.46 (2.45), 312	0.552	1.028 (0.938-1.126)
Sensation seeking	1-5 (lower number = more sensation seeking personality)	3.57 (1.01), 312	**0.027**	0.774 (0.616-0.972)
Resilience	1-5 (higher number = more resilient)	4.12 (0.66), 312	0.111	1.320 (0.938-1.856)
Likelihood of incident occurring in an area close to their place of work	1-9 (higher number = more likely to occur)	3.80 (2.24), 312	**0.030**	1.121 (1.011-1.242)
Likelihood of incident causing severe public health consequences if it did occur	1-9 (higher number = more likely to cause severe public health consequences if it did occur	7.00 (1.99), 312	0.159	0.920 (0.820-1.033)
Likelihood of incident putting own health at risk if it did occur	1-9 (higher number = more likely to put own health at risk if it did occur	6.61 (2.28), 312	**0.004**	0.858 (0.773-0.952)
Length of time spent working for organisation	Years	7.50 (8.45), 312	0.402	1.012 (0.985-1.039)

Table D27 Odds ratios for continuous variables predicting willingness to work in the event of pandemic flu (new strain) (odds ratios adjusted for location)

Predictor Variable	Scale range or unit of measurement	Mean (SD), No of participants	p	Adjusted odds ratio (95% CI) for willingness to work
Organisational Identification	1-5 (higher number = identifies more with organisation)	3.38 (0.83), 312	**0.004**	1.526 (1.148-2.029)
Job satisfaction	1-7 (higher number = more satisfied with job)	5.29 (1.37), 312	**0.001**	1.322 (1.114-1.569)
Belief that going to work during a serious incident will make a big difference to the organisation	1-9 (higher number = more belief role is important)	6.08 (2.35), 312	**0.000**	1.229 (1.111-1.360)
Belief that organisation continuing to function during a serious incident will make a big difference to keeping country running	1-9 (higher number = more belief recovery of organisation is important)	5.65 (2.72), 312	**0.000**	1.254 (1.146-1.371)
Belief that health and safety of staff is priority with management	1-9 (lower number = more belief health and safety is important to employer)	2.74 (1.80) 312	**0.004**	0.825 (0.724-0.940)
Belief that organisation would put continuation of business above personal safety	1-9 (lower number = more belief that organisation would put continuation of business above personal safety)	6.46 (2.45), 312	**0.015**	1.122 (1.023-1.231)
Sensation seeking	1-5 (lower number = more sensation seeking	3.57 (1.01), 312	0.999	1.000 (0.799-1.251)

Predictor Variable	Scale range or unit of measurement	Mean (SD), No of participants	p	Adjusted odds ratio (95% CI) for willingness to work
	personality)			
Resilience	1-5 (higher number = more resilient)	4.12 (0.66), 312	**0.009**	1.597 (1.126-2.266)
Likelihood of incident occurring in an area close to their place of work	1-9 (higher number = more likely to occur)	4.88 (2.37), 312	**0.021**	1.120 (1.017-1.234)
Likelihood of incident causing severe public health consequences if it did occur	1-9 (higher number = more likely to cause severe public health consequences if it did occur	7.77 (1.53), 312	0.154	0.897 (0.773-1.041)
Likelihood of incident putting own health at risk if it did occur	1-9 (higher number = more likely to put own health at risk if it did occur	7.30 (1.95), 312	**0.016**	0.858 (0.757-0.972)
Length of time spent working for organisation	Years	7.50 (8.45), 312	0.136	1.022 (0.993-1.051)

Table D28 Odds ratios for continuous variables predicting willingness to work in the event of a deliberate release of the smallpox virus

Predictor Variable	Scale range or unit of measurement	Mean (SD), No of participants	p	Adjusted odds ratio (95% CI) for willingness to work
Organisational Identification	1-5 (higher number = identifies more with organisation)	3.38 (0.83), 312	0.128	1.265 (0.935-1.710)
Job satisfaction	1-7 (higher number = more satisfied with job)	5.29 (1.37), 312	**0.027**	1.251 (1.026-1.526)
Belief that going to work during a serious incident will make a big difference to the organisation	1-9 (higher number = more belief role is important)	6.08 (2.35), 312	**0.000**	1.237 (1.100-1.392)
Belief that organisation continuing to function during a serious incident will make a big difference to keeping country running	1-9 (higher number = more belief recovery of organisation is important)	5.65 (2.72), 312	**0.000**	1.229 (1.112-1.358)
Belief that health and safety of staff is priority with management	1-9 (lower number = more belief health and safety is important to employer)	2.74 (1.80) 312	0.503	0.953 (0.828-1.097)
Belief that organisation would put continuation of business above personal safety	1-9 (lower number = more belief that organisation would put continuation of business above personal safety)	6.46 (2.45), 312	0.658	1.023 (0.925-1.131)
Sensation seeking	1-5 (lower number = more sensation seeking personality)	3.57 (1.01), 312	0.784	0.967 (0.759-1.232)
Resilience	1-5 (higher number = more resilient)	4.12 (0.66), 312	0.947	1.013 (0.700-1.464)
Likelihood of incident occurring in an area close to their place of work	1-9 (higher number = more likely to occur)	2.33 (1.84), 312	0.318	0.931 (0.808-1.072)
Likelihood of incident causing severe public health consequences if it did occur	1-9 (higher number = more likely to cause severe public health consequences if it did occur	8.00 (1.71), 312	**0.002**	0.802 (0.700-0.920)
Likelihood of incident putting own health at risk if it did occur	1-9 (higher number = more likely to put own health at risk if it did occur	7.33 (2.311), 312	**0.000**	0.826 (0.747-0.914)
Length of time spent working for organisation	Years	7.50 (8.45), 312	**0.013**	1.035 (1.007-1.064)

Table D29 Odds ratios for continuous variables predicting willingness to work in the event of a dirty bomb (odds ratios adjusted for location)

Predictor Variable	Scale range or unit of measurement	Mean (SD), No of participants	p	Adjusted odds ratio (95% CI) for willingness to work
Organisational Identification	1-5 (higher number = identifies more with organisation)	3.38 (0.83), 312	**0.017**	1.514 (1.076-2.128)
Job satisfaction	1-7 (higher number = more satisfied with job)	5.29 (1.37), 312	**0.006**	1.393 (1.101-1.763)
Belief that going to work during a serious incident will make a big difference to the organisation	1-9 (higher number = more belief role is important)	6.08 (2.35), 312	**0.000**	1.336 (1.158-1.543)
Belief that organisation continuing to function during a serious incident will make a big difference to keeping country running	1-9 (higher number = more belief recovery of organisation is important)	5.65 (2.72), 312	**0.000**	1.270 (1.128-1.428)
Belief that health and safety of staff is priority with management	1-9 (lower number = more belief health and safety is important to employer)	2.74 (1.80) 312	0.136	0.882 (0.749-1.040)
Belief that organisation would put continuation of business above personal safety	1-9 (lower number = more belief that organisation would put continuation of business above personal safety)	6.46 (2.45), 312	0.481	1.041 (0.931-1.164)
Sensation seeking	1-5 (lower number = more sensation seeking personality)	3.57 (1.01), 312	0.904	0.984 (0.751-1.288)
Resilience	1-5 (higher number = more resilient)	4.12 (0.66), 312	0.757	1.066 (0.710-1.601)
Likelihood of incident occurring in an area close to their place of work	1-9 (higher number = more likely to occur)	2.74 (1.82), 312	0.161	1.097 (0.964-1.250)
Likelihood of incident causing severe public health consequences if it did occur	1-9 (higher number = more likely to cause severe public health consequences if it did occur	8.24 (1.57), 312	0.102	0.879 (0.753-1.026)
Likelihood of incident putting own health at risk if it did occur	1-9 (higher number = more likely to put own health at risk if it did occur	7.61 (2.19), 312	0.151	0.920 (0.820-1.031)
Length of time spent working for organisation	Years	7.50 (8.45), 312	**0.007**	1.041 (1.011-1.071)

Table D30 Odds ratios for continuous variables predicting willingness to work in the event of severe flooding

Predictor Variable	Scale range or unit of measurement	Mean (SD), No of participants	p	Adjusted Odds ratio (95% CI) for willingness to work
Organisational Identification	1-5 (higher number = identifies more with organisation)	3.38 (0.83), 312	**0.005**	1.678 (1.170-2.406)
Job satisfaction	1-7 (higher number = more satisfied with job)	5.29 (1.37), 312	**0.001**	1.394 (1.144-1.699)
Belief that going to work during a serious incident will make a big difference to the organisation	1-9 (higher number = more belief role is important)	6.08 (2.35), 312	**0.000**	1.259 (1.113-1.423)

Predictor Variable	Scale range or unit of measurement	Mean (SD), No of participants	p	Adjusted Odds ratio (95% CI) for willingness to work
Belief that organisation continuing to function during a serious incident will make a big difference to keeping country running	1-9 (higher number = more belief recovery of organisation is important)	5.65 (2.72), 312	**0.019**	1.138 (1.021-1.267)
Belief that health and safety of staff is priority with management	1-9 (lower number = more belief health and safety is important to employer)	2.74 (1.80) 312	**0.006**	0.815 (0.705-0.943)
Belief that organisation would put continuation of business above personal safety	1-9 (lower number = more belief that organisation would put continuation of business above personal safety)	6.46 (2.45), 312	0.802	1.015 (0.902-1.143)
Sensation seeking	1-5 (lower number = more sensation seeking personality)	3.57 (1.01), 312	0.708	0.972 (0.840-1.126)
Resilience	1-5 (higher number = more resilient)	4.12 (0.66), 312	**0.029**	1.272 (1.025-1.577)
Likelihood of incident occurring in an area close to their place of work	1-9 (higher number = more likely to occur)	4.39 (2.51), 312	0.258	1.072 (0.951-1.208)
Likelihood of incident causing severe public health consequences if it did occur	1-9 (higher number = more likely to cause severe public health consequences if it did occur	5.74 (2.35), 312	**0.037**	0.867 (0.759-0.991)
Likelihood of incident putting own health at risk if it did occur	1-9 (higher number = more likely to put own health at risk if it did occur	4.37 (2.43), 312	0.156	0.917 (0.813-1.034)
Length of time spent working for organisation	Years	7.50 (8.45), 312	0.919	0.998 (0.964-1.033)

Table D31 Odds ratios for continuous variables predicting willingness to work in the event of a deliberate release of pneumonic plague

Predictor Variable	Scale range or unit of measurement	Mean (SD), No of participants	p	Adjusted odds ratio (95% CI) for willingness to work
Organisational Identification	1-5 (higher number = identifies more with organisation)	3.38 (0.83), 312	**0.018**	1.490 (1.072-2.072)
Job satisfaction	1-7 (higher number = more satisfied with job)	5.29 (1.37), 312	0.090	1.198 (0.972-1.475)
Belief that going to work during a serious incident will make a big difference to the organisation	1-9 (higher number = more belief role is important)	6.08 (2.35), 312	**0.000**	1.275 (1.119-1.453)
Belief that organisation continuing to function during a serious incident will make a big difference to keeping country running	1-9 (higher number = more belief recovery of organisation is important)	5.65 (2.72), 312	**0.000**	1.318 (1.174-1.479)
Belief that health and safety of staff is priority with management	1-9 (lower number = more belief health and safety is important to employer)	2.74 (1.80) 312	0.278	0.918 (0.786-1.072)
Belief that organisation would put continuation of business above personal safety	1-9 (lower number = more belief that organisation would put continuation of business above personal safety)	6.46 (2.45), 312	0.740	1.018 (0.915-1.133)
Sensation seeking	1-5 (lower number = more sensation seeking	3.57 (1.01), 312	0.596	0.933 (0.721-1.207)

Predictor Variable	Scale range or unit of measurement	Mean (SD), No of participants	p	Adjusted odds ratio (95% CI) for willingness to work
	personality)			
Resilience	1-5 (higher number = more resilient)	4.12 (0.66), 312	0.730	1.072 (0.722-1.591)
Likelihood of incident occurring in an area close to their place of work	1-9 (higher number = more likely to occur)	2.27 (1.82), 312	0.830	0.984 (0.852-1.138)
Likelihood of incident causing severe public health consequences if it did occur	1-9 (higher number = more likely to cause severe public health consequences if it did occur	8.08 (1.58), 312	**0.005**	0.807 (0.694-0.937)
Likelihood of incident putting own health at risk if it did occur	1-9 (higher number = more likely to put own health at risk if it did occur	7.49 (2.15), 312	**0.012**	0.867 (0.776-0.969)
Length of time spent working for organisation	Years	7.50 (8.45), 312	**0.012**	1.037 (1.008-1.067)

Table D32 Odds ratios for continuous variables predicting willingness to work in the event of severe snow (odds ratios adjusted for gender)

Predictor Variable	Scale range or unit of measurement	Mean (SD), No of participants	p	Adjusted odds ratio (95% CI) for willingness to work
Organisational Identification	1-5 (higher number = identifies more with organisation)	3.38 (0.83), 312	0.062	2.944 (1.362-6.361)
Job satisfaction	1-7 (higher number = more satisfied with job)	5.29 (1.37), 312	0.078	1.233 (0.977-1.556)
Belief that going to work during a serious incident will make a big difference to the organisation	1-9 (higher number = more belief role is important)	6.08 (2.35), 312	**0.034**	1.168 (1.012-1.348)
Belief that organisation continuing to function during a serious incident will make a big difference to keeping country running	1-9 (higher number = more belief recovery of organisation is important)	5.65 (2.72), 312	0.270	1.075 (0.946-1.222)
Belief that health and safety of staff is priority with management	1-9 (lower number = more belief health and safety is important to employer)	2.74 (1.80) 312	**0.001**	0.764 (0.649-0.900)
Belief that organisation would put continuation of business above personal safety	1-9 (lower number = more belief that organisation would put continuation of business above personal safety)	6.46 (2.45), 312	0.172	1.101 (0.959-1.263)
Sensation seeking	1-5 (lower number = more sensation seeking personality)	3.57 (1.01), 312	0.706	1.070 (0.752-1.522)
Resilience	1-5 (higher number = more resilient)	4.12 (0.66), 312	**0.029**	1.736 (1.057-2.851)
Likelihood of incident occurring in an area close to their place of work	1-9 (higher number = more likely to occur)	5.95 (2.23), 312	0.352	1.076 (0.922-1.255)
Likelihood of incident causing severe public health consequences if it did occur	1-9 (higher number = more likely to cause severe public health consequences if it did occur	4.64 (2.40), 312	0.246	0.916 (0.789-1.063)
Likelihood of incident	1-9 (higher number = more	3.89 (2.48), 312	0.085	0.885 (0.770-1.017)

Predictor Variable	Scale range or unit of measurement	Mean (SD), No of participants	p	Adjusted odds ratio (95% CI) for willingness to work
putting own health at risk if it did occur	likely to put own health at risk if it did occur			
Length of time spent working for organisation	Years	7.50 (8.45), 312	0.251	0.977 (0.939-1.017)

Table D33 Odds ratios for continuous variables predicting willingness to work in the event of a nuclear incident (odds ratios adjusted for location)

Predictor Variable	Scale range or unit of measurement	Mean (SD), No of participants	p	Adjusted odds ratio (95% CI) for willingness to work
Organisational Identification	1-5 (higher number = identifies more with organisation)	3.38 (0.83), 312	**0.011**	1.537 (1.103-2.140)
Job satisfaction	1-7 (higher number = more satisfied with job)	5.29 (1.37), 312	**0.004**	1.391 (1.110-1.743)
Belief that going to work during a serious incident will make a big difference to the organisation	1-9 (higher number = more belief role is important)	6.08 (2.35), 312	**0.000**	1.375 (1.193-1.584)
Belief that organisation continuing to function during a serious incident will make a big difference to keeping country running	1-9 (higher number = more belief recovery of organisation is important)	5.65 (2.72), 312	**0.000**	1.275 (1.138-1.429)
Belief that health and safety of staff is priority with management	1-9 (lower number = more belief health and safety is important to employer)	2.74 (1.80) 312	**0.015**	0.806 (0.678-0.959)
Belief that organisation would put continuation of business above personal safety	1-9 (lower number = more belief that organisation would put continuation of business above personal safety)	6.46 (2.45), 312	0.093	1.101 (0.984-1.232)
Sensation seeking	1-5 (lower number = more sensation seeking personality)	3.57 (1.01), 312	0.954	1.008 (0.776-1.309)
Resilience	1-5 (higher number = more resilient)	4.12 (0.66), 312	0.157	1.342 (0.893-2.016)
Likelihood of incident occurring in an area close to their place of work	1-9 (higher number = more likely to occur)	2.09 (1.73), 312	0.703	1.029 (0.890-1.189)
Likelihood of incident causing severe public health consequences if it did occur	1-9 (higher number = more likely to cause severe public health consequences if it did occur	8.25 (1.60), 312	**0.009**	0.822 (0.709-0.952)
Likelihood of incident putting own health at risk if it did occur	1-9 (higher number = more likely to put own health at risk if it did occur	7.69 (2.17), 312	0.060	0.898 (0.804-1.004)
Length of time spent working for organisation	Years	7.50 (8.45), 312	0.063	1.028 (0.999-1.058)

Table D34 Odds ratios for EPPM predicting willingness to work in the event of a bomb/explosive incident (odds ratios adjusted for age)

EPPM Categories	No of participants (%)	No (%) willing to work	p	Adjusted odds ratio (95% CI) for willingness to work
Low Threat Low Efficacy (LTLE)	90 (28.8)	45 (50.0)	0.056	0.530 (0.276-1.016)
Low Threat High Efficacy (LTHT)	79 (25.3)	49 (62.0)	0.526	0.802 (0.406-1.585)
High Threat Low Efficacy (HTLT)	72 (23.1)	28 (38.9)	**0.006**	0.378 (0.189-0.754)
High Threat High Efficacy (HTHT)	71 (22.8)	46 (64.8)		Ref

Table D35 Odds ratios for EPPM categories predicting willingness to work in the event of a chemical warfare agent release

EPPM Categories	No of participants (%)	No (%) willing to work	p	Unadjusted odds ratio (95% CI) for willingness to work
Low Threat Low Efficacy (LTLE)	95 (30.4)	14 (14.7)	**0.016**	0.398 (0.188-0.842)
Low Threat High Efficacy (LTHT)	73 (23.4)	26 (35.6)	0.588	1.209 (0.608-2.404)
High Threat Low Efficacy (HTLT)	67 (21.5)	6 (9.0)	**0.003**	0.229 (0.087-0.607)
High Threat High Efficacy (HTHT)	77 (24.7)	24 (34.3)		Ref

Table D36 Odds ratios for EPPM categories predicting willingness to work in the event of an accidental chemical spill or leak

EPPM Categories	No of participants (%)	No (%) willing to work	p	Unadjusted odds ratio (95% CI) for willingness to work
Low Threat Low Efficacy (LTLE)	116 (37.2)	61 (52.6)	**0.006**	0.389 (0.197-0.766)
Low Threat High Efficacy (LTHT)	85 (27.2)	49 (57.6)	**0.033**	0.461 (0.227-0.938)
High Threat Low Efficacy (HTLT)	46 (14.7)	19 (41.3)	**0.000**	0.230 (0.101-0.523)
High Threat High Efficacy (HTHT)	65 (20.8)	48 (73.8)		Ref

Table D37 Odds ratios for EPPM categories predicting willingness to work in the event of pandemic flu (new strain) (odds ratios adjusted for location)

EPPM Categories	No of participants (%)	No (%) willing to work	p	Adjusted odds ratio (95% CI) for willingness to work
Low Threat Low Efficacy (LTLE)	93 (29.8)	41 (44.1)	**0.000**	0.245 (0.121-0.497)
Low Threat High Efficacy (LTHT)	80 (25.6)	50 (62.5)	**0.040**	0.466 (0.225-0.965)
High Threat Low Efficacy (HTLT)	69 (22.1)	28 (40.6)	**0.000**	0.180 (0.084-3.84)
High Threat High Efficacy (HTHT)	70 (22.4)	54 (77.1)		Ref

Table D38 Odds ratios for EPPM categories predicting willingness to work in the event of a deliberate release of the smallpox virus

EPPM Categories	No of participants (%)	No (%) willing to work	p	Unadjusted odds ratio (95% CI) for willingness to work
Low Threat Low Efficacy (LTLE)	106 (34.0)	25 (23.6)	0.223	0.650 (0.325-1.300)
Low Threat High Efficacy (LTHT)	85 (27.2)	39 (45.9)	0.125	1.701 (0.863-3.352)
High Threat Low Efficacy (HTLT)	56 (17.9)	6 (10.7)	**0.006**	0.250 (0.092-0.678)
High Threat High Efficacy (HTHT)	65 (20.8)	21 (32.3)		Ref

Table D39 Odds ratios for EPPM categories predicting willingness to work in the event of a dirty bomb (odds ratios adjusted for location)

EPPM Categories	No of participants (%)	No (%) willing to work	p	Adjusted odds ratio (95% CI) for willingness to work
Low Threat Low Efficacy (LTLE)	111 (35.6)	15 (13.5)	**0.000**	0.233 (0.107-0.506)
Low Threat High Efficacy (LTHT)	96 (30.8)	27 (28.1)	0.076	0.522 (0.255-1.070)
High Threat Low Efficacy (HTLT)	51 (16.3)	5 (9.8)	**0.001**	0.161 (0.055-0.473)
High Threat High Efficacy (HTHT)	54 (17.3)	22 (40.7)		Ref

Table D40 Odds ratios for EPPM categories predicting willingness to work in the event of severe flooding

EPPM Categories	No of participants (%)	No (%) willing to work	p	Unadjusted odds ratio (95% CI) for willingness to work
Low Threat Low Efficacy (LTLE)	95 (30.4)	73 (76.8)	0.147	0.539 (0.234-1.243)
Low Threat High Efficacy (LTHT)	76 (24.4)	71 (93.4)	0.266	2.227 (0.717-6.912)
High Threat Low Efficacy (HTLT)	67 (21.5)	50 (74.6)	0.088	0.467 (0.195-1.120)
High Threat High Efficacy (HTHT)	74 (23.7)	64 (86.5)		Ref

Table D41 Odds ratios for EPPM categories predicting willingness to work in the event of a deliberate release of pneumonic plague

EPPM Categories	No of participants (%)	No (%) willing to work	p	Unadjusted odds ratio (95% CI) for willingness to work
Low Threat Low Efficacy (LTLE)	106 (34.0)	19 (17.9)	**0.041**	0.459 (0.217-0.970)
Low Threat High Efficacy (LTHT)	93 (29.8)	33 (35.5)	0.831	1.079 (0.535-2.179)
High Threat Low Efficacy (HTLT)	56 (17.9)	4 (7.1)	**0.002**	0.159 (0.050-0.507)
High Threat High Efficacy (HTHT)	57 (18.3)	19 (33.3)		Ref

Table D42 Odds ratios for EPPM categories predicting willingness to work in the event of severe snow (odds ratios adjusted for gender)

EPPM Categories	No of participants (%)	No (%) willing to work	p	Adjusted odds ratio (95% CI) for willingness to work
Low Threat Low Efficacy (LTLE)	88 (28.2)	75 (85.2)	0.294	0.588 (0.217-1.587)
Low Threat High Efficacy (LTHT)	72 (23.1)	67 (93.1)	0.646	1.325 (0.399-4.404)
High Threat Low Efficacy (HTLT)	74 (23.7)	63 (85.1)	0.297	0.583 (0.211-1.608)
High Threat High Efficacy (HTHT)	78 (25.0)	71 (91.0)		Ref

Table D43 Odds ratios for EPPM categories predicting willingness to work in the event of a nuclear incident (odds ratios adjusted for location)

EPPM Categories	No of participants (%)	No (%) willing to work	p	Adjusted odds ratio (95% CI) for willingness to work
Low Threat Low Efficacy (LTLE)	113 (36.2)	18 (15.9)	**0.005**	0.358 (0.173-0.737)
Low Threat High Efficacy (LTHT)	86 (27.2)	32 (37.2)	0.861	1.062 (0.540-2.092)
High Threat Low Efficacy (HTLT)	49 (15.7)	3 (6.1)	**0.001**	0.123 (0.34-0.442)
High Threat High Efficacy (HTHT)	64 (20.5)	23 (35.9)		Ref

Table D44 Responses to survey item 19: Are you well informed about the business continuity arrangements/plans at the organisation where you currently work?

Response options	Response percentage
Yes – I am fully informed	25.6
Yes – But I only know some details	26.6
I am aware they exist but don't know any details	26.3
No – I don't know if the organisation has any business continuity arrangements/plans	19.9
No – the organisation does not have any business continuity arrangements/plans	1.6

Table D45 Responses to survey item 35a: I believe my organisation has taken steps to find out what might prevent staff from reporting to work during a serious incident (Likert Scale: 1 = strongly agree, 5 = strongly disagree)

Response options	Response percentage
1	17.0
2	30.8
3	22.8
4	17.6
5	11.9

Table D46 Responses to survey item 35b: During a serious incident my organisation wouldn't be interested in why I wasn't willing to come to work, only that I wasn't at work (Likert Scale: 1 = strongly agree, 5 = strongly disagree)

Response options	Response percentage
1	9.6
2	9.3
3	19.6
4	38.5
5	32.1

Appendix E: Focus group modelling data

Table E1 Pneumonic plague scenario modelling data

Day post event	Cumulative symptomatic Cases	Proportion of cases per day	Cumulative Deaths	Proportion of deaths per day	Number of cases per day	Number of deaths per day	Cumulative cases	Cumulative deaths
0	0.000	0.000	-	-	0	-	-	-
1	0.014	0.014	0.000	0.000	128	0	128	0
2	0.157	0.142	0.002	0.002	1,269	15	1,397	15
3	0.416	0.260	0.030	0.029	2,316	256	3,713	272
4	0.652	0.236	0.139	0.109	2,106	969	5,819	1,241
5	0.810	0.158	0.326	0.187	141	167	5,959	1,408
6	0.900	0.090	0.532	0.205	80	183	6,040	1,591
7	0.948	0.049	0.703	0.171	43	153	5,955	1,744
8	0.974	0.025	0.824	0.120	22	107	6,106	1,852
9	0.986	0.013	0.900	0.076	11	68	6,117	1,920
10	0.993	0.007	0.945	0.045	6	40	6,123	1,960
11	0.996	0.003	0.970	0.025	3	22	6,126	1,982
12	0.998	0.002	0.984	0.014	2	12	6,128	1,995
13	0.999	0.001	0.991	0.007	1	7	6,128	2,001
14	0.999	0.000	0.995	0.004	0	4	6,129	2,005
15	1.000	0.000	0.997	0.002	0	2	6,129	2,007
16	1.000	0.000	0.999	0.001	0	1	6,129	2,008
17	1.000	0.000	0.999	0.001	0	1	6,129	2,008
18	1.000	0.000	1.000	0.000	0	0	6,129	2,009
19	1.000	0.000	1.000	0.000	0	0	6,129	2,009
20	1.000	0.000	1.000	0.000	0	0	6,129	2,009

NB: Data includes successful intervention by public health authorities. However, after day 4 it is assumed that 10% of the total number of infected people did not go to the treatment centre or did not go in time. Secondary cases not included for this scenario.

Appendix F: Focus group injects

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Inject 1: Mock News Broadcast Script

John Anchor, *(voicing over intro shot)*: 'Our top story: Found - the terrorist device used to bring Plague to the UK – hidden in the rafters of a busy train station.
(Back to shot of anchor in news studio)
John Anchor: Good evening. Tonight police are at the start of a major investigation following the discovery of the device terrorists used to deliver their deadly attack on train travellers earlier this week. After numbers of people being admitted to hospitals with suspected Plague soared, investigators were yesterday able to narrow down what it was that connected them - a journey in rush hour on a busy commuter train from Victoria station.
Then, last night came the breakthrough investigators were hoping for. Police officers discovered the device in the rafters of the station following a finger-tip search of the building and track.
Now the site of the attack has been identified – a busy mainline station - fears are growing for the numbers of people who will have been affected.
Our reporter Hazel Westwood is outside Victoria station this evening. Hazel, what's the latest?
(OB of Hazel Westwood outside train station)
Hazel Westwood: Well, as you can see, the train station is now a crime scene which officers are scouring to gather as much evidence as they can before the station re-opens.
Health officials insist that the station poses no threat to public health and will be safe to open to the public once police officers have finished here.
John Anchor: Do we know how the terrorists were able to access the station and plant such a deadly device?
Hazel Westwood: At this moment in time, no John, we don't and police are keeping pretty tight-lipped about their theories at this stage. What we can say though, is that the transport infrastructure in the USA has come under similar attack in recent months so we could be looking at a well-practised model.
What is also very clear is that the effect of this attack has been devastating to the South East and increasingly further a-field, with more than 100 people in Kent alone with chest and respiratory symptoms and hospitals struggling to cope.
John Anchor: What are the doctors saying about the casualties? How many people are expected to be affected?
Hazel Westwood: Earlier today I managed to speak to Dr Bowen, from the Health Protection Agency's Centre for Emergency Protection and Response, who said that emergency plans were being initiated and implemented in the South East, to deal with what is an escalating public health emergency.
(Shot to clip of Hazel's interview with Dr Bowen)
Hazel Westwood: Thanks for speaking to us, Dr. Bowen. First of all, can you tell me whether or not all those at the station have been traced?
Dr Bowen: We're requesting that anyone who was at the station 2 hours either side of the estimated release time, which we think is approximately 5pm, go to one of the mass treatment centres that are being set-up in sport facilities and M.o.D. sites. A list of these sites is available from NHS Direct. People going to these centres will be assessed and given antibiotic treatment to make sure that they do not contract the disease. Contact tracing of those who had contact with infected individuals is continuing. Otherwise the advice to the public is to carry on as normal – if they have concerns they should call NHS Direct or visit their GP.
Hazel Westwood: What's the significance of the contact tracing – can people catch Plague by being in contact with someone who caught the disease at the station?
Dr. Bowen: Yes it is a possibility and one we're concerned about which is why it is a vital part of our response to this situation.
Hazel Westwood: But with so many people having passed through that station during the rush hour when the disease was released, is contact tracing enough – will you also be recommending for example, that travel is restricted and public gatherings cancelled?
Dr Bowen: No, the advice is to carry on as usual.
Hazel Westwood: Is this advice, in part, based on the fact that hospitals are already under enormous pressure from this crisis, with Intensive Care Departments particularly struggling? If mass treatment centres have been established, you must be anticipating that considerable numbers of people will require treatment?
Dr. Bowen: I can't comment on hospital capacities but NHS organisations have emergency plans which are being activated. The mass treatment centres are a way forward which provides a targeted response to a specific emergency, which this quite clearly is.
Hazel Westwood: That was Dr.Bowen, from the HPA**.** John, back to you in the studio.

Inject 2: News website article

EXERCISE MATERIAL

News.uk

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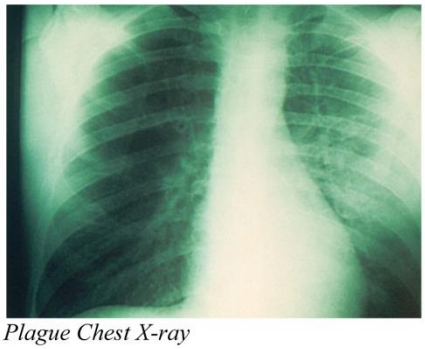
London gripped by pneumonic plague

A further 141 cases of pneumonic plague have been confirmed in London today, bringing the total number of cases confirmed in the region since last week's terrorist attack to 5,959. The number of deaths currently stands at 1,408.



Plague Chest X-ray

On Friday authorities reported that they had located the source of Tuesday's pneumonic plague outbreak – terrorists had planted a dispersal device in the rafters of Victoria train station in London. Anyone who was at the station during the evening rush hour on Tuesday 16th October has been advised to attend one of the mass treatment centres that have been set up.

GPs are taking a large number of calls from worried patients and hospital A&E departments are dealing with an increased number of visits. Many hospitals are struggling with capacity issues due to the need to isolate patients who are confirmed as having pneumonic plague.

"it is fatal for those who do not receive treatment in time"

Professor George Hester from Public Health England said: 'We cannot overemphasise the seriousness of the situation at this stage. Although pneumonic plague is easily treatable with antibiotics, it is fatal for those who do not receive treatment in time. If you think you were at Victoria station in the time period the authorities are concerned about, or you think you have had close contact with someone showing symptoms then please attend a treatment centre immediately. I would like to emphasize once again how effective treatment can be, if it is given in time. If you did not go near the station and you have not had close contact with anyone showing symptoms them the advice is still to carry on as normal'.

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London gripped by pneumonic plague

Police 'still searching' for plague attackers

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Plague is an acute bacterial infection caused by the organism Yersinia pestis.

Provided the disease is identified in its early stages, it can be treated very effectively with antibiotics.

The incubation period for pneumonic plague following inhalation is 1-4 days. This means that after coming into contact with the bacteria the symptoms will usually appear within 4 days, after which patients can deteriorate rapidly if they are not treated.

People who have caught the disease will experience flu-like symptoms with fever, headache and chills, progressing to pneumonia with cough, shortness of breath and chest pain. Additional symptoms suggestive of plague include blood in the sputum and gastrointestinal symptoms.

It is possible to pass pneumonic plague to another person through the inhalation of droplets from the cough or sneeze of an infected individual. Therefore people with symptoms of pneumonic plague should be isolated, and continue to remain isolated for 3 days after they have started antibiotics.

Source: Public Health England

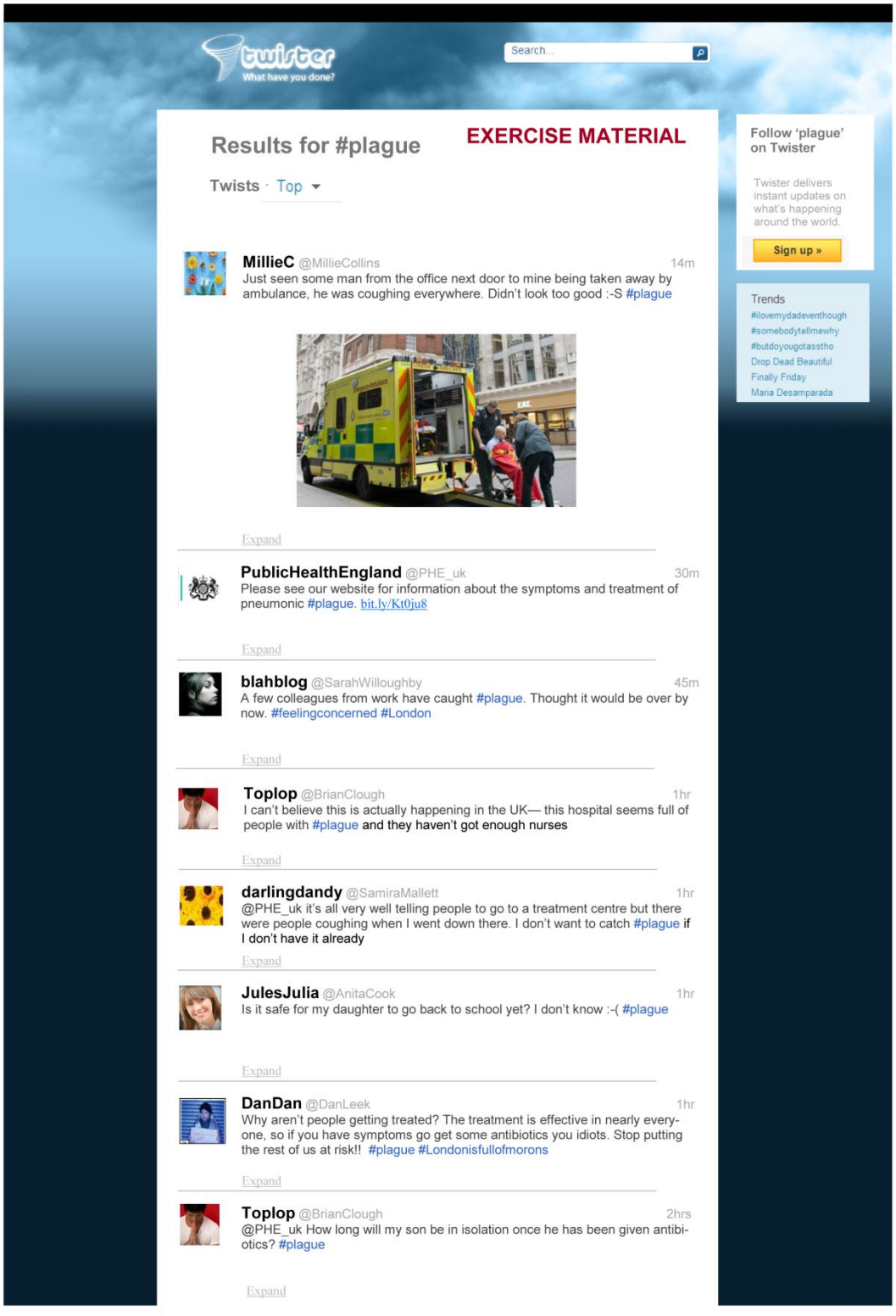
Police are asking for anyone who thinks they might have any information about the event to please get in touch. They have also released this statement:

'At this stage we believe this to be an isolated incident. However, please remain vigilant and if you see anything that looks suspicious then please call the police immediately. '

For more on this story please click on the links below. For more information about pneumonic plague please go to the PHE website

EXERCISE MATERIAL

Inject 3: Social media inject



Appendix G: Focus group discussion guide

Stage 1: TV NEWS REPORT

1) First reactions - Written responses:

First reactions to hearing the report:

- What you might be 'thinking'
- What you might be 'feeling'
- Anything you might 'do'

2) Discussion - General:

- What you might be thinking and feeling
- What if you had been at the station – does anybody go through Victoria station?
- What if you hadn't been near the station
- What concerns might you have about themselves
- Thoughts about family/significant others
- Any possible protective actions likely to be considered
- What further information do you want and where would you look for it

Prompts:

Would you attend a treatment centre if you were at the station either side of 5pm?

Would you carry on as normal?

Would you contact GP/NHS Direct for advice if concerned?

3) Discussion - Organisation focused:

- What are you thinking about going to work tomorrow or the next day
- What information do you think you would get from their employer
- What information would you want to get from your employer
- Who at your organisation would they want to hear from – who would you trust to tell you it's safe to come into work – is there anyone you wouldn't trust
- Thoughts about commuting
- Thoughts about colleagues
- Precautions you might take in light of the report

Prompts:

What barriers might prevent you from being *able/willing* to report to work?

What might help your *ability/willingness* to report to work?

Stage 2: NEWS WEBSITE ARTICLE

1) First reactions: Written responses:

First reactions to reading the article:

- What you might be 'thinking'
- What you might be 'feeling'
- Anything you might 'do'

2) Discussion - General:

- What you might be thinking and feeling
- What concerns you have
- Any possible actions likely to be considered
- What further information do you want (what questions would you have) and where would you look for it
- Thoughts about family/significant others

Prompts:

Would you attend a treatment centre if you thought you'd been in contact with someone who was at the station at that time, or someone who was later confirmed as having plague?

Would you carry on as normal?

Would you contact GP/NHS Direct for advice if concerned?

3) Discussion - Organisation focused:

- What are you thinking about going to work tomorrow or the next day
- What information do you think you would get from their employer
- What information would you want to get from your employer
- Who at your organisation would they want to hear from – who would you trust to tell you it's safe to come into work – is there anyone you wouldn't trust
- Thoughts about commuting
- Thoughts about colleagues (what if there was a confirmed case in the office)
- Precautions you might take in light of the report

Prompts:

What barriers might prevent you from being *able/willing* to report to work?

What might help your *ability/willingness* to report to work?

Stage 3: SOCIAL MEDIA POST

1) First reactions: Written responses

First reactions to seeing the social media post:

- What you might be 'thinking'
- What you might be 'feeling'
- Anything you might 'do'

2) Discussion - General:

- What you might be thinking and feeling
- What concerns you might have
- Any possible actions likely to be considered
- What further information do you want and where would you look for it
- Thoughts about family/significant others
- Any thoughts about the authenticity of the post
- Any concerns about the timeline – 2 weeks later

3) Discussion - Organisation focused:

- What are you thinking about going to work
- What if there was a confirmed case in the office or the office next door as in the post
- What information would you expect to get from your employer via social media
- What information would you want to get from your employer via social media
- Who at your organisation would they want to hear from – who would you trust to tell you it's safe to come into work
- Thoughts about commuting
- Thoughts about colleagues
- Precautions you might take in light of the social media post

Prompts:

What barriers might prevent you from being *able/willing* to report to work?

What might help your *ability/willingness* to report to work?